DELHI CANTONMENT BOARD

CANTONMENT GENERAL HOSPITAL
DELHI CANTT-10

Tender

for

Supply, Installation, Testing & Commissioning of Medical Gas Pipe Line (Manifold) System at Cantonment General Hospital, Delhi Cantt.

VOLUME – II

GENERAL INSTRUCTION TO BIDDERS,

CONDITIONS OF CONTRACT
&
TECHNICAL SPECIFICATION

2014

Tender No. DCB/H/TN/MGMS/29/2014

A. General

1.0 Scope of work:

1.1.1 **Delhi Cantonment Board invites bids for the Supply, Installation, Testing & Commissioning of Medical Gas Pipe Line (Manifold) System at Cantonment General Hospital, Delhi Cantt-10.**

1.2 The successful bidder will be expected to complete the works within **5 (Months)** from the date of Award of work**.**

2.0 The Employer:

Delhi Cantonment Board will enter into the agreement with the chosen contractor.

2.1 In these documents wherever the word tender / tenderer / tendering has been used, the same shall be considered synonymous with bid/bidder/bidding.

3.0 Information to be submitted:

3.1 All bidders shall include the following information and documents with their bids:

1. A work plan clearly bringing out how the bidder proposes to carry out the work to achieve the time schedule.

4.0 Cost of bidding:

The bidder shall bear all costs associated with the preparation and submission of his bid, and the Employer will in no case be responsible or liable for those costs.

5.0 Site visit:

The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for himself on his own responsibility and at his own risk all information that may be necessary for preparing the bid and entering into a contract for the works as detailed in the Scope of work. The cost of visiting the Site shall be at the bidder's own expense.

B. Bidding Documents

6.0 Content of bidding documents:

The set of bidding documents comprises the documents listed below:

Volume-I : Pre-Qualification Criteria
Volume-II : Conditions of contract & Technical specifications
Volume-III : Bill of Quantities

7.0 Clarification of bidding documents:

A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing which must be received by the employer earlier than 7 days prior to last date of submission of bids.

8.0 Amendment of bidding Documents:

8.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.

8.2 Any addendum thus issued shall be part of the bidding documents and shall be communicated in writing on the hospital notice board and the website.

8.3 To give prospective bidders reasonable time to take an addendum into account in preparing their bids, the Employer may extend as necessary, the deadline for submission of bids in accordance with Sub-Clause 16.2.

C. <u>Preparation of Bids</u>

9.0 Language of bid:

All documents relating to the bid shall be in English Language only.

10.0 Documents comprising the bid:

The bid submitted by the bidder shall comprise the following:

(a) Bid Security
(b) All information and document regarding the pre-qualification
(c) Conditions of Contract
(d) Specifications
(e) Bill of Quantities
(f) Tender drawings, if any
(g) Documents mentioned in 3.1 above

and any other documents required to be completed and submitted by bidders in accordance with these instructions.

11.0 Bid prices:

11.1 The bidder shall fill the rates against each item of BOQ both in words and figures. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause shall be included in the rates, prices, and total amount of bid submitted by the bidder. The evaluation and comparison of bids by the Employer shall be made accordingly.

11.3 The rates and prices quoted by the bidder shall be fixed for the duration of the Contract and shall not be subject to adjustment on any account.

12.0 Currencies of bid and payment:

The rate to be quoted by the bidder shall be in Indian Rupees.

13.0 Bid validity:

13.1 Bids shall remain valid for a period of 120 days after the deadline for bid submission specified in Clause 16.

13.2 In exceptional circumstances, the bidders may be requested to extend the period of validity for a specified additional period. The request and the bidders' responses shall be made in writing or by fax/e-mail. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security for the period of the extension, and in compliance with Clause 14 in all respects.

14.0 Bid security:

14.1 The bidder shall furnish, as part of his bid, a security amount as mentioned in the advertisement.

14.2 The bid security and cost of document shall be in the form of a Demand Draft/Bankers Cheque from a Nationalized/Scheduled bank payable at Delhi.

14.3 Any bid not accompanied by an acceptable bid security shall be rejected.

14.4 The bid security of unsuccessful bidders will be returned within 28 days of the end of the bid validity period specified in Sub-Clause 13.1.

14.5 The bid security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required performance security.

14.6 The bid security will be forfeited:
(a) if the bidder withdraws his bid during the period of bid validity;
(b) if the bidder does not accept the correction of his bid price, pursuant to Clause 23; or
(c) in the case of a successful bidder, if he fails within the specified time limit to :
(i) sign the Agreement ; or
(ii) furnish the required performance security.

14.7 No interest will be payable on the bid security amount cited above.

15.0 Sealing, marking and submission of bid:

15.1 The bid shall be submitted in accordance with the procedure detailed herein. Documents shall be enclosed in separate envelopes of appropriate size each of which shall be sealed.

(i) **Envelope No. 1** shall contain the bid security as indicated in clause 14 of these instructions to bidders and Bid document fee/Tender Fee.

(ii) **Envelope No. 2** shall contain the bidder's application for pre-qualification, original bid document comprising of Volume-I (Prequalification document) & Volume –II (General Instructions to bidders, Conditions of Contract & Technical Specifications) and all the asked information and documents in support of pre-qualification.

(iii) Envelope No. 3 shall contain only the bill of quantities (Vol III) and rates/prices duly filled in and signed and stamped without any conditions whatsoever. Bids containing any conditions in Envelope no. 3 are liable to be summarily rejected. In case of any variation between the rates mentioned in figures and words, the rates in words shall prevail.

The format of Bill of Quantity in the Price Bid should be neatly hand written. The Bill of Quantity in the Price Bid in any other format other than the tendered format or typed written shall be rejected. The contractor must fill up the prices both in words and figures.

Please note that the price should not be indicated in any of the documents enclosed in envelope 1 & 2.

All bidders are required to submit unconditional bids. Conditional bids if submitted shall be liable to be rejected and no correspondence in this regard shall be entertained.

15.2 The bidder shall seal the bid.

15.3 All the three envelopes shall be sealed and enclosed in an envelope and addressed to the **CMO, Cantonment General Hospital, Delhi Cantt.-10.**

15.4 All the above envelope shall bear the following identification.

Name of work: - Supply, Installation, Testing & Commissioning of Medical Gas Manifold System at Cantonment General Hospital, Delhi Cantt.

15.5 All the envelopes shall indicate the name and address of the bidder to enable the bid to be returned unopened, if required.

15.6 All recipients for the purpose of submitting a bid shall treat the contents of the documents as private and confidential.

16.0 Deadline for submission of bids:

16.1 Bids must be received at the address specified above not later than the designated date and time.

16.2 The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 8, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

17.0 Late bids:

Any bid received by the Employer after the deadline prescribed in Clause 16.0 will be returned unopened to the bidder.

18.0 Modification and withdrawal of bids:

18.1 The bidder may modify or withdraw his bid by giving notice in writing before the deadline prescribed in Clause 16.

18.2 The bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with Clause 15, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate.

18.3 No bid may be modified after the deadline for submission of bids.

18.4 Withdrawal of bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in the Form of Bid may result in the forfeiture of the bid security pursuant to Clause 14.

D. <u>Tender Opening and Evaluation</u>

19.0 Bid opening:

19.1 Bids shall be opened at the Hospital half an hour after the prescribed time for tender submission in presence of the bidders representatives who may wish to be present.

Envelope No.1: Shall be opened first. If the bid Security &tender fee is not found as prescribed the bid shall be summarily rejected.

Envelope No.2: Shall then be opened. The applications of bidders for pre-qualifications and the information and documents submitted in (Vol-I & Vol-II) shall be evaluated.

Envelope No.3: Containing the sealed price bid of only for those parties whose bid is found to be generally in order and substantially responsive shall be opened either at the bid opening or at a subsequent date to be intimated in advance to such eligible bidders.

19.2 The Employer will examine the bids to determine whether they are complete, whether the requisite bid securities have been furnished, whether the bids have been properly signed and whether the bids are generally in order.

19.3 Telegraphic/ fax offer will be treated as defective/ invalid and rejected. Only detailed complete bids received prior to the closing time and date will be taken as valid.

19.4 The bidders names, general technical details, the presence of the requisite bid security and such other details as the Employer, at his discretion may consider appropriate will be announced at the bid opening.

19.5 The bidder should quote **cost of CMC in the Price Bid and the rate of CMC will be added for evaluation and ranking purpose.**.

19.6 The bid of any bidder who has not complied with any of the instructions contained herein may not be considered.

20.0 Process to be confidential:

20.1 Information relating to the examination, clarification, evaluation, and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a bidder to influence the Employer 's processing of bids or award decisions may result in the rejection of his bid**.**

21.1 Clarification of bids:

21.1 To assist in the examination, evaluation, and comparison of bids, the Employer may, at his discretion, ask any bidder for clarification of his bid, including break down of unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause 23.

22.0 Examination of bids and determination of responsiveness:

22.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid (a) meets the eligibility criteria; (b) has been properly signed; (c) is accompanied by the required securities; (d) is substantially responsive to the requirements of the bidding documents; and (e) provides any clarification and/or substantiation that the Employer may require.

22.2 A substantially responsive bid is one which conforms to all the terms, conditions, and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the bidding documents, the Employer 's right or the bidder's obligations under the contract or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

22.3 If a bid is not substantially responsive, it will be rejected by the **Employer**, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

23.0 Correction of errors:

23.0.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows :

(a) Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and

(b) If the bidder does not accept the corrected amount of bid, his bid will be rejected, and the bid security may be forfeited in accordance with Sub-Clause 14. 6(b).

24.0 Currency for bid evaluation:

Bids shall be evaluated as quoted in Indian Rupees in accordance with Clause 12.

25.0 Evaluation and comparison of bids:

25.1 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 22.

25.2 In evaluating the bids, the Employer will determine for each bid the Evaluated Bid Price by
adjusting the Bid Price after making any correction for errors pursuant to Clause 23.

E. <u>Award of Contract</u>

26.0 Award Criteria:

26.1 Subject to Clause 27, the Employer on behalf of the Employer intends to award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the Lowest Evaluated Bid Price.

27.0 Employer's right to accept any bid and to reject any or all bids:

27.1 Notwithstanding Clause 26, the Employer on behalf of the Employer reserves the right to accept or reject any bid, and to cancel the bidding process and reject all bids, at any time prior to the award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the ground for the Employer's action.

28.0 Notification of award:

28.1 Prior to expiration of the period of bid validity prescribed, the Employer will notify the successful bidder that his bid has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall name the estimated sum which the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

28.2 The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provision of Clause 29.

28.3 Upon furnishing by the successful bidder of a performance security and signing of the contract, the Employer on behalf of the Employer will promptly notify the other bidders that their bids have been unsuccessful by a suitable notice on the hospital notice board.

29.0 Performance Security:

29.1 Within 15 days of receipt of the notification of award on behalf of the Employer, the successful bidder shall furnish to the Employer a performance security in the form of a bank guarantee for an amount equivalent to 10% of the Contract Price. The performance security shall be valid till the successful completion of the Defect Liability Period by the Contractor.

29.2 Failure of the successful bidder to comply with the requirements of Sub-Clause 29.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the bid security.

Section II. Conditions of Contract

A. General

1.0 Definitions:

1.1 Terms which are defined in the Contract Data are not defined in the Conditions of Contract but keep their defined meanings. Capital initials are used to identify defined terms.

Acceptance is the date when the Contract came into existence upon receipt by the Contractor of the Letter of Acceptance issued by the Employer.

The Activity Schedule is a schedule of the activities comprising the construction, installation, testing, and commissioning of the Works.

The Completion Date is the date when the Employer notifies that the works can be used by the Employer.

The Contract is the contract between the Employer of the one part and the Contractor of the other.

The Contract Data defines the documents and other information which comprise the Contract.

The Contractor is a person or corporate body whose bid to carry out the Works has been accepted by the Employer.

The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.

The Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; months are calendar months.

A Defect is any part of the Works not completed in accordance with the Contract.

The Employer is the person named in the Contract Data who is responsible for supervising the Contractor, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, awarding extensions of time etc. For this purpose it would be the CEO, Delhi Cantonment Board/ an officer authorized by the CEO.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

The Initial Contract Price is the Contract Price at the date of the Employer's written acceptance of the Contractor's Bid.

The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Employer by issuing an Extension of time.

Plant is any integral part of the Works which is to have a mechanical, electrical, electronic or chemical function.

The Site is the area defined as such in the Contract Data.

The Start Date is given in the Contract Data. It is the date when the Contractor can commence work on the Contract.
It does not necessarily coincide with any of the Site Possession Dates.

A Subcontractor is person or corporate body who has a contract with the Contractor to carry out a part of the work in the Contract.

Temporary Works are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A Variation is an instruction given by the Employer which varies the Works.

The Works are what the Contract requires the Contractor to construct, install, and hand over to the Employer.

2.0 Interpretation:

In interpreting these Conditions of Contract, singular also means plural, male also means female, and vice versa. Headings and cross-references between clauses have no significance. Words have their normal meaning under the language of the Contract unless specifically defined.

3.0 Language and law:

The language of the Contract and the law governing the Contract are stated in the Contract Data**.**

4.0 Employer's decisions:

The Employer is to decide contractual matters between the Employer and the Contractor fairly and impartially.

5.0 Delegation:

The Employer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

6.0 Communications:

Communications between parties which are referred to in the conditions are effective only when in writing**.**

7.0 Removal of personnel:

If the Employer asks the Contractor to remove a person who is a member of his staff or his work force and states his reasons the Contractor is to ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

8.0 Contractor's risks:

8.1 All risks of loss of or damage to Delhi Cantonment Board property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

Excepted Risks are:

a. (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
(ii) Rebellion, revolution, insurrection, or military or usurped power, or civil war,
(iii) ionizing radiations, or contamination by radio - activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio - active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
(iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speed,

b. loss or damage due to the use or occupation by the Employer of any section or part of the Permanent Works, except as may be provided for in the Contract.

c. loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible.

9.0 Insurance:

9.1 The following insurance cover **110%** is to be provided by the Contractor in the joint names of the Employer and the Contractor for the period from the Start Date to the end of the Defects Notice Period or of the last Defects Correction Period whichever is later:

(a) cover against damage to other people's property caused by the Contractor's acts or omissions;
(b) cover against death or injury caused by the Contractor's acts or omissions to
(i) anyone authorised to be on the Site ;
(ii) third parties who are not on the Site ;
(c) cover against damage to the Works and materials during construction.

9.2 Policies and certificates for insurance are to be produced by the Contractor to the Employer for approval before the Start Date given in the Contract Data and subsequently as the Employer may require.

9.3 If the Contractor does not produce any of the policies and certificates required, the Employer
may affect the insurance for which the Contractor should have produced the policies and certificates and recover the premiums it has paid from payments due to the Contractor.

9.4 Alterations to the terms of insurance may be made either with the approval of the Employer or as a result of general changes imposed by the insurance company with which the insurance policy is affected.

9.5 Both parties are to comply with conditions of the insurance policies.

10.0 Indemnities:

10.1 The Contractor is liable for and indemnifies the Employer against losses, expenses and claims for loss or damage to Delhi Cantonment Board property, personal injury, and death caused by his own acts or omissions.

10.2 The Contractor indemnifies the Employer against claims for damage caused by the movement of his Equipment or Temporary Works outside the Site.

11.0 Queries about the contract data:

The Employer is to give instructions clarifying queries about the Contract Data.

12.0 Contractor to execute the works:

12.1 The Contractor is to execute the work of **Supply, Installation, Testing & Commissioning of Medical Gas Pipe Line (Manifold) System at Cantonment General Hospital, Delhi Cantt., Delhi** in accordance with the Specification and contract.

13.0 The works to be completed by the intended completion date:

The Contractor may begin the Works on the Start Date and is to carry out the Works in accordance with the program submitted by him, as updated with the approval of the Employer, and complete them by the Intended Completion Date.

14.0 Approval of samples shall be taken by the contractor prior to their delivery at site.

15.0 Safety:

The Contractor is responsible for the safety of all activities on the Site.

16.0 Possession of the site:

The Employer is to give possession of all parts of the Site to the Contractor, where the work is required to be executed. If possession of a part is not given by the date stated in the Contract Data, the Employer is deemed to have delayed the start of the relevant

activities.

17.0 Access to the site:

The Contractor is to allow the Employer and any person authorized by the Employer access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

18.0 Instructions:

The Contractor shall carry out all instructions of the Employer.

19.0 Procedure for disputes:

If any dispute or difference of any kind what so ever shall arise between the Employer and the contractor or the Employer and the contractor in connection with or arising out of the Contract, or the execution of the works, whether during the progress of the works or after their completion and whether before or after the termination, abandonment or breach of the contract, it shall, in the first place, be referred to and settled by the Employer who shall, within a period of ninety days after being requested by either party to do so, give written notice of his decision to the Employer and the Contractor. Subject to arbitration, as hereinafter provided, such decision in respect of every matter so referred shall be final and binding upon the Employer and the Contractor and shall forthwith be given effect to by the Employer and by the Contractor, who shall proceed with the execution of the works with due diligence whether he or the Employer requires arbitration or not. If the Employer has given written notice of his decision to the Employer and the Contractor and no claim to arbitration has been communicated to him by either the Employer or the Contractor within a period of ninety days from receipt of such notice, the said decision shall remain final and binding upon the Employer and the Contractor. If the Employer shall fail to give notice of his decision, as aforesaid within a period of ninety days after being requested, or if either the Employer or the Contractor be dissatisfied with any such decision, then and in any such case either the Employer or the Contractor may within ninety days after receiving notice of such decision or within ninety days after the expiration of the first named period of ninety days as the case may be require that the matter or matters in dispute be referred to arbitration as hereinafter provided. All disputes or differences in respect of which the decision if any of the Employer has not become final and binding as aforesaid, shall be finally settled under the Indian Arbitration and Conciliation Act, 1996 or any statutory modification or re - enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause. Such arbitration shall be settled by Sole arbitrator who shall be appointed by Incharge, Delhi Cantonment Hospital. The arbitration shall take place in New Delhi unless both parties agree otherwise. Neither party shall be limited in the proceedings before the arbitrator to the evidence nor did arguments put before the Employer for the purpose of obtaining his said decision. No decision given by the Employer in accordance with the foregoing provisions shall disqualify him from being called as a witness and giving evidence before the arbitrator on any matter whatsoever relevant to the dispute or difference referred to the arbitrator as aforesaid. The reference to arbitration may proceed notwithstanding that the works shall not then be or be alleged to be complete provided always that the obligations of the Employer and the Contractor shall not be altered by reason of the arbitration being

conducted during the progress of the works.

B. Time Control

20.0 Program:

20.1 Within the time stated in the Contract Data, the Contractor shall submit to the Employer for his approval a program showing the general methods, arrangements, order, and timing for all the activities in the Works.

20.2 The Contractor is to submit to the Employer an updated program as required by the Employer.

20.3 The Employer's approval of the program does not alter the Contractor's obligations. The Contractor may revise the program and submit it to the Employer again at any time. A revised program is to show the effect of Variations.

21.0 Extension of the intended completion date:

21.1 The Employer is to extend the Intended Completion Date if an event not attributable to the contractor causing delay occurs or a Variation is issued which makes it impossible for completion to be achieved by the Intended Completion Date.

21.2 The Employer is to decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking him to decide upon the effect of a event causing delay or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by his failure is not considered in assessing the new Intended Completion Date.

22.0 Delays ordered by the Employer:

The Employer may instruct the Contractor to delay the start or progress of any activity within the Works.

23.0 Management meetings:

23.1 The Employer and/ the Contractor may be required the other to attend a management meeting. The business of a management meeting is to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

C. Quality Control

24.0 Identifying defects:

The Employer is to check the Contractor's work and to notify the Contractor of any Defects which he finds. Such checking does not affect the Contractor's responsibilities. The Employer may instruct the Contractor to search for a Defect and to uncover and test any work which he considers may have a Defect.

25 & 26.0 Inspection & Tests:

Inspection and Tests of all equipment will be carried out before supply to the site and for other plumbing, electrical and masonry work as per the relevant BIS at site. Incase it is not available in BIS the same shall be carried out as per decision given by Employer based on existing general practice which will be binding to the agency. The material which is not passing to BIS or any other test will be rejected or may be accepted with reduced rates as per decision taken by Employer.

27.0 Defect Liability

27.1 The contractor warrants that the goods supplied under the contract is new, unused and incorporated all recent improvements in design and materials unless prescribed otherwise by the purchaser in the contract. The contractor further warrants that the goods supplied under the contract shall have no defect arising from design, materials or workmanship or from any act or omission of the contractor that may develop under normal use of the supplied goods under the conditions prevailing in India.

27.2 This Defect Liability shall remain valid for **Twelve (12) months** after the goods or any portion thereof as the case may be, have been delivered to the final destination and installed and commissioned at the final destination and accepted by the purchaser in terms of the contract, unless specified otherwise in the SCC.

27.3 In case of any claim arising out of this Defect Liability , the purchaser / consignee shall promptly notify the same in writing to the contractor. **The contractor shall attend with 95% uptime during Defect Liability period of the complete system otherwise with penalty of extension of Defect Liability period by double the downtime period actually taken by the contractor.**

27.4 Upon receipt of such notice, the contractor shall, within 8 hours on a 24(hrs) x 7 days) x 365(days) basis, repair or replace the defective goods or parts thereof, free of cost, at the ultimate destination. The contractor shall take over the replaced parts / goods after providing their replacements and no claim, whatsoever shall lie on the purchaser for such replaced parts / goods thereafter.

27.5 In the event of any rectification of a defect or replacement of any defective goods during the Defect Liability period, the Defect Liability for the rectified / replaced goods shall be extended to a further period of Twelve (12) months from the date such rectified / replaced goods starts functioning to the satisfaction of the purchaser.

27.6 If the contractor, having been notified, fails to rectify / replace the defect(s) within 8 hours on a 24(hrs)) x 7 (days) x 365 (days) basis, the purchaser may proceed to take such remedial action(s) as deemed fit by the purchaser, at the risk and expense of the contractor and without prejudice to other contractual rights and remedies, which the purchaser may have against the contractor.

27.7 During Defect Liability period, the contractor is required **to visit at each consignee/s site at once in a months** commencing from the date of the installation for preventive maintenance of the goods.

28.0 Incorrect defects after completion date:

28.1 After completion the Employer may arrange for a third party to correct a Defect if the contractor has not corrected it within the Defects Correction Period.

28.2 The Employer is to give the Contractor at least 28 days notice of his intention to use a third party to correct a Defect. If the Contractor does not correct the Defects himself within this notice period, the Employer may have the Defect corrected by the third party. The cost of the correction will be deducted from the Contract Price.

D. Cost Control

29.0 Bill of quantities:

29.1 The Bill of Quantities is to contain items for the work to be done by the Contractor.

29.2 The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

30.0 Changes in the quantities:

30.1 Final work done may exceed to any extent item wise as well as total work value wise, as per the requirement of the works to be executed under the contract.

30.2 If requested by the Employer, the Contractor is to provide the Employer with a detailed cost breakdown of any rate in the Bill of Quantities.

31.0 Variations:

31.1 All Variations are to be included in updated programs produced by the Contractor.

32.0 Payments for variations:

If the contract does not contain any rates or prices applicable to the varied work, the rates and prices in the contract shall be used as basis for valuation so far as may be reasonable, failing which , after due consultation by the Employer with the contractor, suitable rates or prices shall be agreed upon between the Employer and the contractor. In the event of disagreement, the Employer shall fix such rates or prices as are, in his opinion, appropriate based on CPWD norms and shall notify the contractor accordingly.

33.0 Cash flow forecasts:

33.1 The contractor shall provide cash flow forecast at the start of work to the Employer. When the program is updated, the Contractor is to provide the Employer with an updated cash flow forecast**.**

34.0 Payment certificates:

34.1 The contractor shall submit to the Employer monthly statements of the value of the work completed less the cumulative amount certified previously on a printed proforma (prepared at the cost of Contractor).

34.2 The Employer shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.

34.3 The Employer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

35.0 Payment

35.1 75% of BOQ rate shall be paid on satisfactory receipt of equipment/materials at Site and after inspection and verification of equipment/materials and their respective documents including internal factory final inspection-cum quality report and material test reports etc. on pro-rata basis.

35.2 15% of BOQ rate shall be paid on satisfactory erection, installation and commissioning of entire system and successful completion of running tests and removal of all defects if arises during running and operation of the system of Medical Gas Manifold System at site and take over by the Employer.

35.3 10% of BOQ rate shall be paid on completion of 30 days trial run from the date of takeover by the employer.

The following shall be the terms of payment for the comprehensive Maintenance services;

a) The payment shall be released quarterly as per the quoted rates for the particular year as follows :

100% - On submission of unconditional Bank guarantee of equal amount from any Nationalized/ Scheduled Bank and in the acceptable format and valid for one year (i.e. valid during the entire operation and maintenance period for the particular year).

36.0 Taxes:

Taxes shall be deducted as applicable.

37.0 Cost of Labour:

The Contractor shall be deemed to have allowed in his Tender Price for the full cost of labour having due regard to the provision of all labour legislation of the Central and State Government which are in force on the date of the tender and which are applicable to labour engaged for the Contract.

38.0 Retention Amount:

38.1 The Employer is to retain from each payment due to the contractor the proportion stated in the Contract Data until Completion of the whole of the Works.

38.2 On Completion of the whole of the Works, half the total amount retained is repaid to the Contractor and balance half when the Defects Notice Period has passed and the Employer has certified that all Defects notified by him to the Contractor before the end of this period have been corrected. The second half of the retention may be paid against submission of Bank Guarantee approved by the Employer from any nationalized bank if applicable.

39.0 Liquidated damages:

39.1 If the contractor fails to complete execution of works within the relevant time as specified in the Contract Data / Extended date, the contractor shall pay the employer the relevant sum as stated in the Contract Data as liquidated damages for every day or part of a day which shall elapse between the relevant time of completion and the date stated in Taking over certificate

40.0 Securities:

40.1 The performance payment securities are to be provided to the Employer by the Start Date and are to be issued in a form and by a bank acceptable to the Employer.

40.2 If there is no reason to call the performance security, the performance security is to be returned by the Employer within 14 days of the last Defects Correction Period.

40.3 The Employer is to notify the Contractor of any claim made against the institution issuing the security.

40.4 The Employer may claim against the surety if any of the following occurs for 42 days or more

(a) the Contractor is in breach of the Contract and the Employer has notified him that he is
(b) the Contractor has not paid an amount due to the Employer.

41.0 Cost of repairs:

Loss or damage to the Works or materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods is to be mended by the Contractor at the Contractor's cost if the loss of damage arises from the Contractor's acts or omissions.

E. <u>Finishing the Contract</u>

42.0 Completion:

The Employer shall issue a certificate certifying Completion to the Contractor and the Employer when he decides that the work is completed.

43.0 Taking over:

The Employer shall take over the Works within seven days of the Employer issuing a certificate of Completion.

44.0 Final account:

44.1 The Contractor shall furnish to the Employer a detailed account of the total amount which he considers is payable to him under the Contract before the end of the Defects Notice Period. The Employer is to certify any final payment which is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer is to issue a schedule which states the scope of the corrections or additions which are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Employer is to decide on the amount payable to the Contractor.

45.0 Operating and maintenance manuals:

The contractor shall submit operation and maintenance manual for the complete Medical Gas Pipe Line (Manifold) System clearly indicating the trouble shooting, the preventive maintenance to be carried out and maintenance schedule, in three sets in hard binding.

46.0 Remedies and Powers due to Default of Contractor:

46.1 If the contractor shall become bankrupt or if the Employer shall certify in writing to the Employer that in his opinion the contractor.

a) has abandoned the contract, or

b) without reasonable excuse has failed to commence the work or has suspended the progress of the works for twenty eight(28) days after receiving from the Employer written notice to proceed, or

c) has failed to remove materials from the Site or to pull down and replace work twenty eight(28) days after receiving from the Employer written notice that the said materials or work had been condemned and rejected by the Employer under these conditions, or

d) despite previous warnings by the Employer, in writing, is not executing the works in accordance with the contract, or is persistently or flagrantly neglecting to carry out his obligations under the Contract, or

e) has to the detriment of good workmanship, or in defiance of the Employer's instructions to the contrary, sublet any part of the contract, then all the events mentioned in this clause 54.1 shall for the avoidance of doubt be a breach of this contract and the Employer may, after giving fourteen(14) days notice to the contractor, enter upon the site and the works and expel the contractor there from without thereby voiding the contract, or releasing the Contractor from any of his obligations or liabilities under the contract, or affecting the rights and powers conferred on the Employer or the Employer by the contract, and may himself complete the works or may employ any other

contractor to complete the works. The Employer or such other contractor may use for such completion so much of the constructional plant, Temporary works and materials, which have been or are deemed to be reserved exclusively for the execution of works under the provisions of the contract, as he or they may think proper, and the Employer may, at any time sell any of the said constructional plant, Temporary works and unused materials and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to him from the contractor under contract.

46.2 Valuation at date of forfeiture:

The Employer shall as soon as may be practicable after any such entry and expulsion by the Employer, fix and determine ex-parte, or by or after reference to the parties, or such investigation or enquiries as he may think fit to make or institute, and shall certify what amount, if any, had at the time of such entry and expulsion been reasonably earned by or would reasonably accrue to the contractor in respect of work then actually done by him under the contract and the value of any of the said unused or partially used materials, any constructional plant and any Temporary works.

46.3 Payment after forfeiture:

If the Employer shall enter and expel the contractor under this clause, he shall not be liable to pay to the contractor any money on account of the contract until the expiration of the Defects Notice period and thereafter until the costs of execution and maintenance, damages for delay in completion, if any, and all other expenses incurred by the Employer have been ascertained and the amount thereof certified by the Employer. The contractor shall then be entitled to receive only such sum or sums, if any as the Employer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the contractor on due completion by him then the Contractor shall, upon demand pay to the Employer the amount of such excess and it shall be deemed a debt due by the contractor to the Employer and shall be recoverable accordingly.

47.0 Property:

47.1 All materials on the Site, Plant, and Equipment owned by the Contractor, Temporary Works and Works are deemed to be the Property of Employer and are at his disposal if the Contract is terminated because of a fundamental breach of Contract by the Contractor.

48.0 Frustration:

48.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Employer is to certify that the Contract has been frustrated. The Contractor is to make the Site safe and stop work as quickly as possible after receiving this certificate and is to be paid for all work carried out before receiving it and for any work carried out after wards to which he was committed.

49.0 Comprehensive Maintenance contract (CMC):
(The Board reserve the right for contract, placement of order and necessary payment.)

49.1 The purchaser / consignee reserve the rights to enter into Annual Comprehensive Maintenance Contract between Consignee and the Supplier for the period as required after the completion of
Defect Liability period.

49.2 The supplier along with its Indian Agent and the CMC provider shall ensure continued supply of the spare parts for the machines and equipments supplied by them to the purchaser for 5 years after the expiry of one year Defect Liability period.

49.3 The Contractor shall provide comprehensive maintenance services for the Medical Gas Manifold System **for a period of Sixty (60) Months after completion of Defect Liability period** as detailed below:

a. For the Medical Gas Manifold System along with accessories for 5 years.

b. With labour and spares after satisfactory completion of Defect Liability period.

c. The cost of CMC may be quoted along with taxes applicable on the date of tender opening.

d. **The bidder must quote cost of CMC in the Price Bid and the rate of CMC will be added with total cost of Medical Gas Pipe Line (Manifold) System for evaluation and ranking purpose**.

e. The payment of CMC will be made on quarterly basis after satisfactory completion of contract, duly certified by user.

f. **There will be 95% uptime during CMC period of the complete system otherwise with penalty of extension of CMC period by double the downtime period.**

49.4 The comprehensive maintenance services during this period shall be inclusive of all spares, accessories, manpower, tools and tackle, replacement of parts, routine servicing and maintenance of equipment/systems etc. complete in all respects. The consumables like water, electricity and detergents during this period shall be arranged and provided by the Consignee. The Contractor shall carry out all routine and special maintenance of the equipment/plant/system and attend to any defects that may arise in operation of the equipments/system and plant. Consumable items required during the maintenance, loss of which is not attributable to bad material and/or workmanship will be arranged by the Consignee without cost to Contractor.

Section- III Additional Specific Condition of Contract

1. **Supply, installation, Testing, commissioning of Medical Gas Pipe Line (Manifold) System on Turnkey Basis** at **Cantonment General Hospital, Delhi Cantt.**

2. **The bidder must quote cost of CMC in the Price Bid and the rate will be added with the total cost of Medical Gas Pipe Line (Manifold) System for evaluation and ranking purpose.**

3. The bidder may collect the copy of **Cantonment General Hospital layout plan** and visit the site, for complete evaluation of the project before submitting the bid with due permission from the Hospital, New Delhi.

4. The entire project has to be done **on turnkey basis** including internal civil, water piping, plumbing and electrical works including water softening. Any minor details of construction which are obliviously and fairly intended or which may not have been definitely referred to in this contract but which are usual of construction practice and essential to the work shall be included in this contract.

5. The bidder must enclose with their bids the **item wise compliance statement** for their offered equipment, system & accessories and quality standard categorically with respect to the tender specifications.

6. The selection of all equipments and system should be **as per the standard noted** in the specification.

7. Any **misinformation** regarding the specification of the equipment offered would mean outright technical **rejection**.

8. The bidder must submit **Printed catalogue** and technical data sheet to substantiate offer.

9. The bidder must submit **User list and Performance report** of similar type of work, within last 7 years from major hospital.

10. **Defect Liability for One (1) year** from the date of hand-over to the Employer.

11. **95% uptime Defect Liability** during Defect Liability period of the complete system otherwise with penalty of extension of Defect Liability period by double the down time period

12. One year Defect Liability as per Specific conditions of contract of the bidding document. The Defect Liability will be for the main equipment along with accessories from the date of **satisfactory installation issued by user**

13. The bidder, in case of participating in the tender as agent, must include the **Manufacturer's Authorization** Form with the offer after getting duly filled as per Format enclosed in Special Condition of contract.

14. The bidder must have **dealership/distributorship** from the same manufacturer (whose manufactured items are offered in the bid) **at least one year** from the last day of the month previous to the one in which tender is invited.

15. The contractor must provide at least **30 days training program** to the concerned Cantonment General HOSPITAL personnel as per the list submitted by the Employer, on the Medical Gas Manifold System and the necessary cost for training shall be borne by the contractor, failing which any of the Contractor's dues may be withheld.

16. The Bidder should quote all the items. The bid shall be rejected if all the items is not quoted in the Price Bid of the tender.

Section IV. Contract Data

Items marked "N/A" do not apply in this Contract

The following documents are also part of the Contract:

	Clause Reference (Conditions of contract)
*The Contractor's Bid and Letter of Acceptance	[1]
*The Conditions of Contract	[1]
*The Technical Specifications	
*The Program	[20]
*The Priced Bill of Quantities	[29]

The Employer is : The CEO, Delhi Cantonment Board/ any Officer(s) of Delhi Cantonment Board &/or HSCC authorized by the CEO, Delhi Cantonment Board.

*The Start Date is as notified in the letter of Acceptance	
*The Intended Completion Date for the whole work is three months from Date of Award.	[13]
*The Contractor is to submit the program for the works within 7 days of being notified of the acceptance of his bid.	[20]
*The contractor is to submit the updated program at the interval of 15 days	[20.3]
*The Site is located at CANTONMENT GENERAL HOSPITAL, New Delhi	[1]
*The Defect Liability is One year	[27]
*The language of the Contract is English	[3]
*The law which applies to the Contract is the Law of the Union of India, Jurisdiction is High Court of Delhi only	[3]
*Arbitration procedure to be used shall be Arbitration and Conciliation Act 1996 or the latest amended.	[19]

*Appointing Authority for the arbitrator	[19]
*Place where arbitration will take place: New Delhi.	[19]
*The currency of the contract is the Indian Rupees.	
*The proportion of payments retained is 5%. Limited to 5% of contract value.	[38]
*The liquidated damages for the whole of the work are 0.5% (of Contract Price) per week of delay.	[39]
*Maximum liquidated damages shall be 10% of the Contract price.	[39]
*The amounts and currencies of the Performance guarantee are Amount : 10% of Contract price	[40]
Currency: Indian Rupees	
Insurance : 110% coverage	[9]

ANNEXURE - A

FORM OF AGREEMENT

1. This Agreement made the _____ day of _____ 2014 between DELHI CANTONMENT BOARD, Delhi Cantt (hereinafter called "The Employer") who enters into this Agreement of the one part and M/s _____ (hereinafter called "the Contractor") of the other part.

1.1 Whereas the Employer is desirous that certain Works should be executed by the Contractor, viz supply, installation, testing and commissioning of **Medical Gas Manifold System at CANTONMENT GENERAL HOSPITAL** and has accepted a bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

Now this Agreement witnesseth of follows :

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz :

   (a) The Letter of Acceptance ;

   (b) The said bid ;

   (c) The Conditions of Contract ;

   (d) The Specification ;

   (e) The Drawings ;

   (f) The Priced Bill of Quantities ;

   (g) Any other relevant documents referred to this Agreement or in the aforementioned documents

3. In consideration of the payments to be made by the Employer to the Contractor as herein after mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the Contract Price or only such sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

In Witness whereof, the parties hereto have caused this Agreement to be executed the day and year first before written.

Signed, Sealed, and Delivered by the Said _____

Binding Signature of PRESIDENT, DELHI CANTONMENT BOARD

_____

Binding Signature of Contractor _____

in the presence of

Countersigned by the CEO, Delhi Cantonment Board:

Witness (1) :

Witness (2) :

(Delhi Cantonment Board reserves the right to modify the format of the contract document, if so required by the competent authority of the Board)

ANNEXURE - B

PROFORMA FOR PERFORMANCE BANK GUARANTEE
(On a stamp paper of appropriate value from any Nationalized Bank or Scheduled Bank)

To,

Delhi Cantonment Board
……..
……..

Dear Sir,

In consideration of the DELHI CANTONMENT BOARD (hereinafter called Employer) which expression shall include its authorized Officers and successor having awarded to M/s _____ (hereinafter referred to as the said Contractor or `Contractor' which expression shall whenever the subject to context so permits include its successors and assigns) a contract No._____ in terms inter alia, of the Employer Letter No._____ dated_____ and the General Conditions of Contract and upon the condition of the contractor's furnishing security for the performance of the contractor's obligations and discharge of the contractor's liability under and in connection with the said contract upto a sum of Rs. _____ (Rupees _____only) amounting to **10% (Ten percent)** of the total contract value.

1. We,_____(hereinafter called `The Bank' which expression shall include its successors and assigns) having our branch office at _____ and Registered/Head Office at _____ a company registered under the Companies Act, 1956) hereby jointly and severally undertake to guarantee the payment to the Employer in rupees forthwith on demand in writing and without protest or demur or any and all moneys any wise payable by the contractor to the Employer under in respect of or in connection with the said contract inclusive of all the Employer's losses and damages and costs, (inclusive between attorney and client) charges and expenses and other moneys any wise payable in respect of the above as specified in any notice of demand made by the Employer to the Bank with reference to this guarantee upto an aggregate limit of Rs._____(Rupees _____ only).

2. We_____Bank Ltd. further agree that The Employer shall be sole judge of and as to whether the said contractor has committed any breach or breaches of any of the terms and conditions of the said contract and the extent of loss, damage, cost, charges and expenses caused to or suffered by or that may be caused to or suffered by The Employer on account thereof and the decision of The Employer that the said Contractor has committed such breach or breaches and as to the amount or amounts of loss, damage, costs, charges and expenses caused to or suffered by The Employer from time to time shall be final and binding on us.

3. The Employer shall be at liberty without reference to the Bank and without affecting the full liability of the Bank hereunder to take any other security in respect of the

Contractor's obligations and liabilities hereunder or to vary the contract or the work to be done thereunder vis-a-vis the Contractor or to grant time or indulgence to the Contractor or to reduce or to increase or otherwise vary the prices of the total contract value or to release or to forbear from enforcement of all or any of the security and/or any other security(ies) now or hereafter held by The Employer and no such dealing(s) reduction(s) increase(s) or other indulgence(s) or arrangements with the Contractor or release or forbearance whatsoever shall absolve the bank of the full liability to The Employer hereunder or prejudice the rights of The Employer against the bank.

4. This guarantee shall not be determined or affected by the liquidation or winding up, dissolution, or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all monies payable to The Employer in terms thereof.

5. The bank hereby waives all rights at any time inconsistent with the terms of this guarantee and the obligations of the Bank in terms hereof shall not be any wise affected or suspended by reason of any dispute or disputes having been raised by the Contractor stopping or preventing or purporting to stop or prevent any payment by the Bank to The Employer in terms hereof.

6. The amount stated in any notice of demand addressed by The Employer to the Bank as liable to be paid to The Employer by the Contractor or as suffered or incurred by The Employer on account of any losses or damages or costs, charges and/or expenses shall be conclusive evidence of the amount so liable to be paid to The Employer or suffered or incurred by The Employer as the case may be and shall be payable by the Bank to The Employer in terms hereof.

7. This guarantee shall be a continuing guarantee and shall remain valid and irrevocable for all claims of The Employer and liabilities of the contractor arising up to and until midnight of_____.

8. This guarantee shall be in addition to any other guarantee or security whatsoever that The Employer may now or at any time any wise may have in relation to the Contractor's obligations/or liabilities under and/or in connection with the said contract, and The Employer shall have full authority to have recourse to or enforce this security in preference to any other guarantee or security which The Employer may have or obtain and no forbearance on the part of The Employer in enforcing or requiring enforcement of any other security shall have the effect of releasing the Bank from its full liability hereunder.

9. It shall not be necessary for The Employer to proceed against the said Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding that any security which The Employer may have obtained or obtain from the contractor shall at the time when proceedings are taken against the said bank hereunder be outstanding or unrealised.

10. We, the said Bank undertake not to revoke this guarantee during its currency except with the consent of The Employer in writing and agree that any change in the constitution of the said contractor or the said bank shall not discharge our liability hereunder.

11. We_____the said Bank further that we shall pay forthwith the amount stated in the notice of demand notwithstanding any dispute/difference pending between the parties before the arbitrator and/or that any dispute is being referred to arbitration.

12. Notwithstanding anything contained herein above, our liability under this guarantee shall be restricted to Rs._____(Rupees_____) and this guarantee shall remain in force till_____ and unless a claim is made on us within 3 months from that date, that is before_____all the claims under this guarantee shall be forfeited and we shall be relieved of and discharged from our liabilities thereunder.

Dated_____day of_____2014.

For and on behalf of Bank.

Issued under seal :

ANNEXURE - C

PROFORMA FOR BID SECURITY BANK GUARANTEE
(To cover payment of Bid Security & Conditions of Contract)

(On a stamp paper of appropriate value from any Nationalized Bank or Scheduled Bank)

To,

Delhi Cantonment Board

Dear Sir,

In consideration of your agreeing to accept Bank Guarantee for Rs. ---------- (Rupees ----------) in lieu of payment from M/s. …… having their registered office at ……. (thereinafter called the Bidder) towards bid security in respect of your Tender No. ……. Calling for tender for ……..at …….and for due fulfillment of the terms & conditions of the said tender, we hereby undertake and agree to indemnify and keep you indemnified to the extent of Rs…….. (Rupees ……).

In the event of any loss or damages, costs, charges or expenses caused to or suffered by you by reason of any breach or non- observance on the part of the bidder of any terms & conditions of the said tender, we shall on demand and without cavil or argument and without reference to the bidder, irrevocably and unconditionally pay you in full satisfaction of your demand the amounts claimed by you, provided that our liability under this guarantee shall not at any time exceed Rs……

This guarantee herein contained shall remain in full force and till you finalize the tender and select the tender as per your choice and it shall in the event of the said bidder being selected and entrusted with the said work, continue to be enforceable till the said bidder executes the Agreement with you and commences the work as stipulated under the terms & conditions of the said tender have been fully and properly carried-out by the said bidder and accordingly discharges the guarantee.

We also agree that your decision as to whether the bidder has committed ant breach or non-observance of the terms & conditions of the said tender shall be final and binding on us.

We undertake to pay the Consultant any money so demanded by the Consultant notwithstanding any dispute or disputes raised by the Agency/supplier(s) in any suit or proceedings pending before any Court or Tribunal relating thereto, our liability under this present being absolute and equivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Agency/supplier(s) shall have no claim against us for making such a payment.

This guarantee shall continue to be in full force and effect for a period of 120 days from the date of submission of bid. Notwithstanding the above limitations, we shall honour and discharge the claims preferred by you within thirty days of expiry of this guarantee.

We shall not revoke this guarantee during its currency except with your previous consent in writing. This guarantee shall not be affected by any change in Constitution of our Bank or of the Bidder firm. Your neglect or forbearance in the enforcement of the payment of any money, the payment whereof is intended to be hereby secured or the giving of time for the payment hereto shall in no way relieve us our liability under this guarantee.

Dated this ……..day of ….. 201

Yours faithfully

Signature & seal of the Bank (Authorized Signatory)

MANUFACTURER'S AUTHORIZATION FORM

No. ---------- Dated ----------

To

Dear Sir,

Tender No. ----------

We _____ who are established and reputed manufacturer of _____(name & description of goods offered) having factories at _____ (address of factory) do hereby authorize M/s _____ (Name & address of agent) which has been our dealer/distributor since _____, to submit a bid, and sign the contract with you for the goods manufactured by us against the above tender.

No company or firm or individual other than M/s _____ are authorized to bid and conclude the contract for goods manufactured by us against this specific tender.

We hereby extend our full guarantee and Defect Liability as per the clause of Condition of Contract and Additional Specific Conditions of Contract of above tender for goods and services offered for supply by our authorized firm .

Yours faithfully,

(Name)
(Name of Manufacturer)

Note: This authorization letter should be on the letter head of the manufacturer and should be signed by a person competent and having the power of attorney to bind the manufacturer. It should be included by the bidder in its bid.

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION OF CENTRALIZED MEDICAL GAS PIPE LINE (MANIFOLD) SYSTEM

Scope of work **Design, supply, installation, testing, commissioning and handing over of Medical Gas Pipe Line (Manifold) System on turnkey basis and providing of free spare parts and service during One (1) year Defect Liability Period and 5 year CMC.**

The system shall comprise of:

A. **Source Equipments**

Fully Automatic Oxygen manifold & control panel
Fully Automatic N2O manifold & control panel
Vacuum (suction) supply system
Medical Compressed Air System
Anesthesia Gas scavenging system (in O.T)

B. **Distribution pipes.**

C. **Outlets**.

D. **Complete Alarm system**.

E **Horizontal Bed Head Panel**

F **Pendant**

G. **Accessories**

Oxygen flow meter with humidifier
Ward vacuum units
Theatre Suction units.

Standards

- **All imported items should be of international standard like NFPA 99(latest version) standard and UL listed/CE marked or HTM 02-01 (latest version) standard and CE marked. The entire system should be of any one standard only. All indigenous items should be of highest quality to meet the international standard and compatible to the main system.**

1.0 Oxygen System

Oxygen System Shall consists of the followings:-

a) Oxygen Manifold System
b) Fully Automatic Oxygen Control Panel
c) Oxygen Emergency supply system

1. a **Oxygen Manifold (Imported)**

a) ***The oxygen manifold shall be of size 10+10 bulk cylinders***. Manifold shall consist of two high-pressure header bar assemblies to facilitate connection of primary and secondary cylinder supplies. Each header bar shall be provided with 20 numbers of cylinder pigtail connections to suit cylinder valves as per IS 3224 incorporating a check valve at the header connection. The high-pressure header bar shall be designed in such a manner that it can be extended to facilitate additional cylinder connections. Each header bar assembly shall be provided with a high-pressure shut-off valve.

b) The manifold should be so designed that it shall suit easy cylinder changing and positioning.

c) The cylinder should be placed with the help of cylinder brackets and fixing chains which should be zinc plated.

d) The manifold should be suitable to withstand a pressure of 145 Kg/cm2. The manifold should be tested (hydraulically) at 3500 psig pressure and to be supplied along with necessary test certificate.

e) *The Oxygen Manifold System shall be compatible to allow integration with the Liquid Oxygen Tank.*

1. b **Fully Automatic Oxygen Control Panel (Imported):**

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. The unit shall be compact and enclosed in NEMA 1 enclosure.

b) **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.

f) 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 **2000 lpm at 55-60 psig.**

1.c **Emergency Oxygen System (Imported)**

It will have emergency arrangement of one set of Six(6)-cylinder configuration, with Copper tail pipes, Non Return Valves & high flow regulator with pressure gauges for Cylinder & line pressure and safety valve. Pressure regulator shall be detachable from the manifold.

1d. **Oxygen Outlet (Imported)**
As per Sl. No-8

2.0 Nitrous- oxide system

Nitrous Oxide system shall consist of the followings :

a Nitrous Oxide main manifolds supply system

b Fully automatic Nitrous Oxide control panel

c Nitrous-oxide emergency supply system

2.a **Nitrous Oxide Manifold (Imported)**

a) ***The Nitrous Oxide manifold shall be of size 4+4 bulk cylinders***. Manifold shall consist of two high-pressure header bar assemblies to facilitate connection of primary and secondary cylinder supplies. Each header bar shall be provided with 8 numbers of cylinder pigtail connections to suit cylinder valves as per IS 3224 incorporating a check valve at the header connection. The high-pressure header bar shall be designed in such a manner that it can be extended to facilitate additional cylinder connections. Each header bar assembly shall be provided with a high-pressure shut-off valve.

b) The manifold should be so designed that it shall suit easy cylinder changing and positioning.

c) The cylinder should be placed with the help of cylinder brackets and fixing chains which should be zinc plated.

d) ***The manifold should be suitable to withstand a pressure of 145 Kg/cm2. The manifold should be tested (hydraulically) at 3500 psig pressure and to be supplied along with necessary test certificate.***

2.b **Fully Automatic Nitrous Oxide Control Panel (Imported)**

a) The Nitrous Oxide 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. The unit shall be compact and enclosed in NEMA 1 enclosure.

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 will have heaters to prevent ice formation on the regulators at high flow rates.

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

2.c **Emergency Nitrous Oxide System (Imported):**

Emergency system shall have arrangement of Two Cylinder configuration with Copper tail pipes, Non Return Valves & high flow regulator with pressure gauges for Cylinder & line pressure and safety valve. Pressure regulator shall be detachable from the manifold.

2d. **Nitrous Outlet (Imported)**
As per sl. No.-8

3.0 Vacuum (Suction) System (Imported)

Vacuum system shall be **Duplex (One working & One Standby)** stack mounted ***220 cfm capacity (i.e Two pumps together produce vacuum of 220 cfm capacity***.)

- The system shall be of consisting of lubricated rotary vane vacuum pumps with Control Panel equipment and one tank.
- This system shall be capable of removing 99.9□% of oil and smoke particles from the exhaust.
- Each vacuum pump shall be driven by a suitable HP motor. Each pump shall have a capacity of **110 cfm at 19 " HG**.
- The system shall include the following accessories for each pump: inlet check valve, inlet isolation valve, vacuum control switch, oil temperature gauge, thermal malfunction switch and vacuum control switch. Provide flexible connectors on inlet and exhaust of each pump, exhaust tee with union, cock valve as well as copper tubing with shut-off cock for gauge and vacuum switches. The system shall include vacuum storage tank of suitable capacity. The inside of the tank shall be coated for rust protection with a two component coating which provides a hard, durable lining.
- Provide vibration mounting as per NFPA 99/HTM2022/EN737.
- The system shall have UL listed/CE marked control panel
- Provide the panel with a programmable controller with removable terminals to allow quick and easy replacement in the field. The system should be designed to function even if the programmable controller fails. The system shall be equipped with a flashing light pump failure alarm/shutdown at any of the following conditions: motor overload tripped, main disconnect is off, blown fuse, control transformer failure, starter coil failure, Selector Switch is off. The central control unit shall incorporate a colour display with LED indicators and have easy access to system operational information.
- Provide audible and visual local alarm (complete with indicating lights and individual sets of auxiliary contacts wired to the terminal strip for remote alarm indication) for the following: vacuum pump thermal malfunction and reserve vacuum pump in use. Provide manual reset for thermal malfunction shut-down. All control and alarm functions shall remain energized while any vacuum pump in the system remains electrically on-line.
- The bacteria filtration system shall incorporate high efficiency filter elements. A differential vacuum indicator shall be installed across the filter to indicate blockage. Each filter shall be designed and sized to carry the full plant design flow capacity with minimum drop. Bacteria filter elements shall have penetration levels not exceeding 0.005% when tested and utilizing particles 0.02 to 2 micron size range.

3b. Terminal outlets with probes/adapters

As per Sl. No.-8

3c. Flexible tubing having Antistatic core as per ISO with proper colour coded complete as per specifications.

4.0 Air Compressors (Imported)

- The package shall include **one set i.e Duplex (One working and one standby) capacity of approx. 100 scfm at 8.5bar** air compressors, allied equipment, suitable tank and control panel.
- Each air compressor shall have a capacity of **50 scfm at 8.5bar**.
- The system shall be equipped with filters.
- The system shall have UL listed/CE marked control panel.
- Dual air dryers, dual 0.5 micron pre-filters, dual 0.5 micron after-filters, line pressure regulating valves, dew point monitor, CO monitor and other accessories required to meet and exceed the current code requirements shall be mounted on the compressor system base.
- All components shall be completely single-point service connections as per latest international standards.
- There shall be two identical banks of air treatment equipment, piped in parallel and provided with valves to by-pass either filter set for element replacement, maintenance and repair work on one of the sets while still treating medical compressed air through the other set without any sacrifice in air quality. Each bank should consist of three stages of treatment.

- **The first stage shall be a prime efficiency come together with particles removal down to 0.5 micron with 99.9999% retention. This filter removes aerosols and solid particles.**

- **The second stage shall be desiccant heatless air dryer equipped with purge control. Built-in purge saver control shall automatically minimize and adjust the amount of purge air to match the variable airflow. The dry compressed air is discharged from the on-line tower into the third stage.**

- **The third stage shall be a prime efficiency particulate after filter with particle removal down to 0.5 micron. The after filter element shall be provided high particles retention, low pressure drop and long element life.**

- Downstream pressure regulators shall maintain constant discharge pressure of 55 to 60 PSIG (field adjustable).
- Digital dew point and CO monitors with alarm set points at $+39\ ^{0}$ F and 10 PPM are provided with dry contacts for connection to remote alarm panels. A “demand check” for maintenance should as per current code requirements of latest international standards.

- **Besides meeting the requirements of the relevant standard, filtration of medical compressed air shall conform to ISO 8573.1 Class 1.3.1 of medical breathing air.**

4b) Air Outlet (4 Bar)

As per Sl. No.-8

4c) Air Outlet (7 Bar)

As per sl. No.-8

5.0 Distribution piping (Indigenous)

- Copper pipes shall be solid drawn, tempered, seamless, phosphorous deoxidized, non-arsenic and degreased for oxygen service. The chemical composition shall be as per BS-6017: 1981 Table 2, Cu-DHP grade. Distribution Copper Pipe manufactured as per BSEN:13348
- The supply of pipes shall accompany with manufacturers test certificates for physical properties and chemical composition. The supply of pipes shall be further substantiated with inspection certificates from third party inspectors like LLOYDS.
- Each pipe shall be capped at both ends before supply.
- The contractor shall use the following sizes:

	Outer Dia.	Thickness
1.	12mm	0.7mm
2.	15mm	0.9mm
3.	22mm	0.9mm
4.	28mm	0.9mm
5.	42mm	1.2mm
6.	54mm	1.2mm
7.	76.1mm	1.5mm

- 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 and testing

  i) Installation of piping shall be carried out with utmost cleanliness. Only pipes, fittings and valves that have been degreased and fittings brought in polythene sealed bags will be used at site. Pipes fixing clamps shall be of non-ferrous and non-deteriorating plastic suitable for the diameter of the pipe.

ii) All pipe joints shall be made using inert gas using flux less silver brazing method (silver brazing). Continuous purging with oil-free nitrogen to be carried out while brazing is done.

iii) Adequate supports shall be provided while laying pipelines to ensure that the pipes do not sag. Suitable sleeves shall be provided wherever pipes cross through walls/slabs. All pipe clamps shall be non-reactive to copper.

iv) After erection, the pipes will be flushed with dry nitrogen gas and then pressure tested with dry nitrogen at a pressure equal to twice the working pressure or 150 psig, whichever is higher for period of not less than 24 hours.

v) All the piping system shall be tested in the presence of the site-Employer or his authorized representative.

vi) Painting :

All exposed pipes should be painted with two coats of synthetic enamel paint and color codification should be as per IS:2379 of 1963.

6.0 Alarm System (Imported)

a. The master and area alarms as per required locations.

b. Alarm shall be microprocessor based with individual microprocessors on each area display and sensor board. The sensors shall be capable of local or remote mounting. **Each area display module/sensor unit shall be gas specific**. With an error message display for an incorrect connection.

c. The alarms shall be field expandable with the addition of extra modules. Upto six services can be accommodated per standard box

d. Each specific service shall be provided with an LED digital read out comprising of 0-250 psi for positive pressure and 0-30 inch Hg for vaccuum. The digital readout shall provide a constant indication of each service being measured. A bar graph trend indicator shall be provided for each service indicating a green "NORMAL", yellow "CAUTION" and a red "HIGH" or "LOW" alarm condition. Under normal operation the bar graph display shall move up and down in the green range depending on service usage. If an alarm occurs, the "RED" alarm light will flash and the audible alarm will sound. Pushing the "ALARM SILENCE" button will cancel the audible alarm but the unit will remain in the alarm condition until the problem is rectified.

e. The default set points shall be +/- 20% variation from normal condition.

f. In the calibration mode the following parameters shall be field adjustable:

i) High/Low set points
ii) Imperical/Metric Units
iii) Repeat alarm enable/disable

g. Set points shall be adjustable by two on board push buttons.

h. In addition "PUSH TO TEST" & "ALARM SILENCE" buttons shall be easily accessible to operate and test the unit.

i. Combination master/area alarms shall have no moving parts and shall require no maintenance after initial installation.

7.0 Horizontal Bed Head Panels (HBHP) 1800mm long (Imported) for ICU

a. Efficient, safe &. Robust design in extruded aluminum section.

b. Smooth curved surfaces, and choice of base colour and fascia plates.

c. Unit should have integrated rail system to mount accessories& UL listed/CE marked.

d. The headwall system should be constructed of aluminum extrusions joined together to form a carcass to suit the particular application. Unit shall be factory assembled for electrical and mechanical components.

e. Segregation of services i.e. Low voltage supplies, High Voltage supply and Medical gases shall be maintained throughout.

f. Front fascia plate should be removable individually to access for respective service.

g. Bed space management system with optional equipment rail.

h. With all Equipment Rail mount Accessories.

i. All Down drops shall be installed at one end preferably & Vertical drop installed at one end should be covered with Aluminium boxing with matching color.

j. Entire pipe line shall run in continuous horizontal panels with no break for each unit & length as per area where it has to be installed

k. Medical gas pipe line outlets Oxygen-2Nos, Vacuum-2 Nos, Medical Air-1 No.

l. Facility per unit as under;

i) 6/15 Amp Modular Electrical Sockets with switches = 6 sets
ii) IV Pole = 2nos
iii) Vacuum slide = 1no.
iv) Sliding blocks = 2nos.

v) Nurse call system module = 1No.
vi)) Infusion Pump Mounts = 1 No
vii) Monitor Tray with Slider = 1 No.
viii) Utility Basket = 1 No.

8.0 Gas Outlets (No. as per table annexed) (Imported)

a) Outlets shall be manufactured with a 165 mm long Copper inlet pipe stub which is silver brazed to the outlet body. The inlet pipe should be capable of swiveling by 360 degrees for enabling the same to be connected to the pipeline system.

b) Outlet shall be equipped with a primary and secondary check valve and the secondary check valve shall be rated at minimum pressure of 200 p s i. In the event the primary check valve is removed for maintenance there should not be any leakage (on-line maintenance should be possible w/o disrupting the functioning of other outlets). Outlet bodies shall be gas specific by indexing each gas service to a gas specific dual pin indexing arrangement on the respective identification module.

c) There should be a push button release mechanism for disconnecting apparatus accessible from top, bottom and side of outlets.

d) A large color-coded front plate shall be used for ease of gas identification and aesthetic appeal.

e) With the back rough in mounted the outlet shall adjust up to 25 mm variation in wall thickness.

f) The latch valve assembly should accept only corresponding gas specific adaptors.

g) All outlets shall be cleaned and degreased for medical gas service, factory assembled and tested.

9.0 Valve Boxes (Imported)

a) Each recessed zone valve box shall consist of the following components: A steel valve box which can house single or multiple shut-off ball valves with tube extensions, A three piece design Valve, an aluminium frame, and a pull-out removable window.

b) The valve box shall be constructed of 18 gauge steel complete with a baked enamel finish.

c) The doorframe assembly shall be constructed of anodised aluminium and shall be mounted to the back box assembly by screws as provided. The removable front shall consist of a clear window with a pullout ring pre-mounted to the centre of the window.

d) Access to the zone shut-off valves shall be by merely pulling the ring assembly to remove the window from the doorframe. The window can be reinstalled without the use of tools only after the valve handles have been returned to the open position.

e) The window shall be marked with the following :-

1. "CAUTION: MEDICAL GAS CONTROL VALVE
2. CLOSE ONLY IN EMERGENCY"

f) Valves shall be a 4-bolt design, bronze body, double seal, union ball-type, with Teflon (TFE) seats and Viton seals, "O" ring packing, and ball which seals in both directions, blow-out proof stem, with a pressure rating of 2760 kPa (400 psig). Valves shall be operated by a lever-type handle requiring only a quarter turn from a fully open position to a fully closed position. All valves shall be equipped with type "K" washed and degreased copper pipe stub extensions of sufficient length to protrude beyond the sides of the box.

g) The entire valve body and pipe stubs shall be plated to a minimum of 25 mm (1") beyond the sides of the back box, but in no instance shall the plating be extended to the ends of the pipe stubs. All pipe stub extensions shall be supplied with suitable plugs or caps to prevent contamination of the assembly prior to installation.

h) Each valve shall be supplied with an identification bracket bolted directly onto the valve body for the purpose of applying an approved medical gas identification label. A package of labels shall be supplied with each valve box assembly for application by the installer.

i) Valves shall be available with line pressure gauges, as required. Gauges shall be 51 mm (2”) diameter, with metal case and ring.

j) Pressure gauges shall read 0-700 kPa (0-100 psig) for all gases except nitrogen, which shall read 0-2000 kPa (0-300 psig), and vacuum, which shall read -100-0 kPa (0-30" Hg).

10.0 Anesthesia Gas Scavenging System (Imported):-

The Duplex Medical Vacuum System must be fully compliant with the latest edition of NFPA 99/HTM02-01/EN737/DIN Standard and should be suitable for anaesthetic gas scavenging for 6 nos. Operation Theatres. One pump working and one pump will be standby.
The package should consist of two ‘oil –less’ rotary vane vacuum pumps, a control panel and a receiver all mounted on a common base frame.

Vacuum Pump :
Each vacuum pump shall operate completely dry and shall be equipped with self-lubricating carbon/graphite vanes.

Bearings shall be permanently lubricated and sealed

No oil shall be permitted in any pump

Each pump should be completely air cooled and have absolutely no water requirements

Each pump should have a 5 micron inlet filter and should be equipped with a vacuum relief valve, check valve to prevent back-flow through off-cycle units, flexible connector, isolation valve and vibration isolators at each mounting location

The receiver should be ASME coded, rated for a minimum 150 psig design pressure and have a three valve bypass system to allow for draining of the receiver without interrupting the vacuum service.

Control System :

The duplex control system should be NEMA 12 and U.L. labelled/CE marked

The control system should provide automatic lead/lag sequencing with circuit breaker disconnects for each vacuum pump with external operators, full voltage motor starters with overload protection, control circuit transformers, visual and audible reserve unit alarm with isolated contacts for remote alarm, hand-off-auto lighted selector switches and runtime hour meters.

A programmable logic controller (PLC) should control the automatic alteration of both vacuum pumps with provision for simultaneous operation if required, and automatic activation of reserve unit if required.

11.0 **Electrical Distribution Panel** -

Panel shall be wall mounted and fabricated from16/14 SWG CRCA Sheet dulypowder 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.

12.0 Accessories

12.1 **Flow meter with Humidifier (Imported) CE Marked**

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

A Control within a range of 0 – 15 Lpm.
B It will meet strict precision and durability standard.
C The flow meter body should be made of brass chrome plated materials.
D The flow tube and shroud components should be made of clear, impact resistant polycarbonate.
E Flow Tube should have large and expanded 0 – 15 lpm range for improved readability at low flows.
F Inlet filter of stainless steel wire mesh to prevent entry of foreign particles.
G The humidifier bottle is made of unbreakable & Reusable of polycarbonate material and autoclavable at 121 degree centigrade.

12.2 **Ward Vacuum Units (Imported) CE Marked**

Ward vacuum Unit shall be wall mounted and shall consists of followings with same make :-

- Suction Controller/ Regulator (Digital/Analogue type- easy view)
- Collection bottle 600 to 1800ml with mounting arrangement.

The vacuum regulator will be step-less adjustable and have large vacuum gauge providing digital/analogue indication of the suction supplied by the regulator.

Safety trap shall be provided inside the jar to safeguard the regulator from overflowing. Different color options should be available.

The unit will be consisting of reusable 600 to 1800 ml shatter resistant bottle, each made up of Polycarbonate material and fully autoclavable at 121 degree centigrade.

12.3 **Theatre Vacuum Units (Imported) CE Marked**

The vacuum regulator will be step-less adjustable and have large vacuum gauge providing Digital/Analogue indication of the suction supplied by the regulator. Safety trap will be provided inside the jar to safeguard the regulator from overflowing. Different color options should be available.

The unit will be consisting of two reusable 1800 to 2000 ml shatter resistant bottle, each made up of Polycarbonate material and fully autoclavable at 121 degree centigrade.

A 3-way valve will select the collection jars : Left, Right or Both.

All the above items should be mounted on aluminum Trolley having free moving castor wheels.

ALTERNATELY TECHNICAL SPECIFICATION AS PER HTM 02-01 STANDARD

1.0 Medical Oxygen Manifold 10 + 10 cylinders – (Imported) (Shall confirm to HTM 02-01 Standard)

The Modular manifold supply system should provide Oxygen piped distribution system. The Modular Manifold system should be such which increase flexibility and allows easy enlargement of the manifold capacity if a future increase in gas demand is required. The system should comprises basic components i.e. Primary header, Secondary header, 2-cylinder rack, 1-cylinder rack, Non – return valve, Blanking plug, and corner connector. The primary head should be mounted on a 2-cylinder rack which can be connected to the left and right inlets of Automatic Control Panel. Each header should have a brass block with 2 non – return valves and brazed connection pipe. If the header is required to extend around either an internal or external corner, a corner connector should be made available. The manifold supply system cylinder rack should locate vertical gas cylinders which should be restrained by chains. It should be make from steel for durability and with a paint finish.

The non- return valves should be incorporated into the header assembly to protect the system in the event of tailpipe fracture. For better access and increases safety the non-return valve block should be positioned on the header rack mid – way between the cylinder positions. Flexible copper tail pipes should be used to connect the gas cylinders and the manifold header Connection points.

Manifold should have specific tailpipe connections in accordance with HTM-02-01/C11.

2.0 Fully automatic Oxygen Gas Control System – (Imported) (Shall confirm to HTM 02-01 Standard)

The Manifold Control System should supply any type of medical gas from both left and right hand manifold banks. Operation and performance criteria should fully satisfy the requirements of HTM 02-01/C11. The Manifold control System should supply a flow of 1000 L/min. to a 400 kPa (4 bar) distribution system and a flow of 2000L/min to a 700kPa(7bar) distribution system or 1100 kPa (11 bar). Either the left or right hand manifold bank may be designated “Duty” and the should automatically changeover to supply the distribution system from the “Standby” bank when pressure in the “Duty” bank falls to be a pre-determined level.

There should be a 2 stage duplex system to provide a high flow rate. Each side of the should be capable of being fully isolated, via a full flow ball valve, in order to change any regulator without a cessation of supply. The inlet of the 1st stage regulator should be protected from the particulate matter by a moulded bronze filter.

All regulators should be protected from over-pressurization by relief valves which are vented to atmosphere. There should be a bypass valve fitted to the 2nd stage regulators to allow nitrous oxide to be vented outside the manifold room during the commissioning stage. Multi stage regulators combined into a single stage is not acceptable. Regulators shall comply with BS EN 738-2.

To simplify installation there should be an installation bracket attached to the wall with four screws; the main panel then should locate on to this bracket and be secured. The Control Panel should be housed in a single panel having a solid construction using epoxy technology in a glass reinforced polymer moulding for high strength, high chemical and corrosion resistance. The cover should hinge upwards but should remain facing outward for manual operation and maintenance accessibility.

For added safety the voltage inside the panel should not exceed 12v dc. The mains supply transformer should be in its own housing in a moulded recess at the rear of the panel.

There should be a fail safe system in the event of power failure so that solenoid valves open and there is full continuity of supply pressure and flow. Upon power restoration the unit should revert back to the original bank of cylinders being used.

To avoid inadvertent resetting of the change cylinder alarm the solenoid valves should be latched to that once changeover has occurred and the cylinders replaced a reset button must be operated to cancel the alarm condition.

To aid maintenance the copper connections within the panel should be flat face/'O' ring design and facilitate easy removal of the regulators and pressure switches. There should be manual changeover buttons so that servicing either side of the system can be simply achieved. The PCB's should be linked with plug and socket connectors for easy removal.
The standard range of manifold control systems are 'CE' marked under the Medical Devices Directive. Under this directive, the specified products are classified as Class IIb Medical Devices.

1.2 Emergency Oxygen System: 10 Cylinders with Test point -(Imported) shall confirm to HTM 02-01 Standard)

Emergency Reserve Manifold

The Emergency Reserve Manifold shall conform to NHS Health Technical Memorandum No.02-01 (HTM 02-01), BS EN ISO 7396-1, BS EN ISO 15001 and BS EN ISO 10524-2. The manifold control system shall provide an uninterrupted supply of a specific medical gas from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators, providing a constant nominal downstream pipeline gauge pressure of 400 kPa, 700 kPa or 1100 kPa. The Emergency Reserve manifold shall be supplied fully assembled and tested. A Gem 10 terminal unit test point shall be fitted, which shall be isolated from the main supply with a ball valve. The manifold shall be supplied with a non-return valve for connection to the distribution system, enabling a continuous supply of gas to the distribution system upon failure of the normal supply. To simplify installations the complete manifold fitted to a wall mounting plate attached to the wall with four screws.

Pressure Regulation

There shall be two separate stages of pressure regulation to enable high peak flow rates without a significant reduction in downstream pressure. Multistage regulators combined into a single unit are not acceptable. The inlet of the 1st stage regulator shall be protected from the particulate

matter by a 25um sintered brass filter. Sintered aluminum bronzes shall not be used. Regulators shall comply with BS EN ISO 10524-2 and shall be supplied with documented test reports upon request, confirming successful completion of the oxygen ignition tests stated therein. The manifold control system shall capable of supplying a flow of 1000 1/min to a nominal 400 kPa distribution system, 1350 1/min to a nominal 700 kPa distribution system and a flow of 1800 1/min to a nominal 1100 kPa distribution system based on a 10% reduction in flowing pressure from a static pressure set point. All regulators shall be protected from over pressurization by relief valves that are vented to atmosphere.

Materials

All Polymers and elastomers in the gas flow that can be subjected to working pressure greater than 3000 kPa shall be halogen-free. The use of PTFE, PCTFE, Viton and other halogenated polymers in these applications is strictly prohibited. Non-return valves fitted to header manifolds shall have a metallic seat with ceramic ball. Soft seat non-return valves utilizing polymers or elastomers are not acceptable.

Emergency Reserve Manifold Operation

Either the left or right hand of the manifold bank shall be designated as “Duty”, with the other manifold bank being designated as “Standby”. When the bank pressure in the “Duty” bank falls to 68 bar (14 bar for nitrous ozide), a “Reserve Low” or “Reserve Fault” alarm condition shall be initiated by a contact pressure gauge, which shall be indicated on the relevant medical gas central alarm panel and /or primary supply automatic manifold panel. The “Standby” bank shall also be provided with a contact pressure gauge, such that any leakage of gas over an extended period of which causes the pressure in the standby bank to fall below 68 bar (14 bar for nitrous oxide), will also initiate a “Reserve Low” or “Reserve Fault” alarm condition.

Non-return valves shall be fitted to each tailpipe connection point to protect the system in the event of a tailpipe fracture.

Corner connectors shall be available to enable installation of manifold headers around corners of the manifold room. A custom length corner connector shall also be available to enable header manifolds to be installed in a ‘U’ configuration across 3 adjacent walls of a manifold room.

CE Marking

The standard ranges of Emergency Reserve Manifolds are ‘CE’ marked under the Medical Devices Directive (Lloyd’s Register Quality assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

Modular Header Manifolds

Modular header manifolds shall provide connection points for flexible cupronickel tailpipes. ‘Secondary’ headers shall connect directly to the manifold control system with extensions for additional cylinders being provided by the addition of further headers. The assembly should consist of -2cylinder x 6 cylinder connection. The Reserve / Standby Manifold should consists

of a centrally mounted regulator Emergency supply Manifold. The cylinder capacity per bank should be increased by installing the required number of Modular Manifold headers and racks.

2.0 **Medical Nitrous Oxide Manifold 4 + 4 cylinders (Imported)**
(Shall confirm to HTM 02-01 Standard)

The Modular Manifold supply system shall provide Oxygen piped distribution system. It shall confirm to HTM 02-01. The Modular Manifold system shall be such which increases flexibility and allows easy enlargement of the manifold capacity if a future increase in gas demand is required. The system should comprise basic components and shall be constructed of i.e. Primary Header, Secondary header, 2-cylinder rack, 1-cylinder rack, Non-return valve, Blanking plug, and corner connector. The primary head should be mounted on a 2 cylinder rack which can be connected to the left and right inlets of Automatic Control panel. Each header should have a brass block with 2 non – return valves and brazed connection pipe. If the header is required to extend around either an internal or external corner, a corner connector shall be made available. The manifold supply system cylinder rack should locate vertical gas cylinders which should be restrained by chains. It should be made from steel for durability and with paint finish.

Each Non-return valve shall have a hard seat ceramic ball. Soft seat Non-return valves are not acceptable. The non- return valves should be incorporated into the header assembly to protect the system in the event of tailpipe fracture. For better access and increased safety the non-return valve block should be positioned on the header rack mid – way between the cylinder positions. Flexible copper tail pipes should be used to connect the gas cylinders and the manifold header Connection points.

A custom length corner connector shall also be available to enable header manifolds to be installed in a "U" configuration across 3 adjacent walls of manifold room.

Manifold shall have specific tallpipe connections in accordance with HTM-2022/C11 and HTM 02-01.

The system shall be "CE" marked under the Medical Devices Directive (Lloyd's Register Quality assurance). Under this directive, the specified products are classified as class 11b Medical Devices.

2.1 **Fully Automatic Control panel Nitrous Oxide System (Imported)**
(Shall confirm to HTM 02-01)

The manifold Control System should supply any type of medical gas from both left and right hand manifold banks. Operation and performance criteria should fully satisfy the requirements of HTM 02-01/C11. The Manifold Control System shall supply a uninterrupted flow of 500 L/min. to a 400 kPa (4 bar) distribution system and a flow of to a (7 bar) distribution system. Either the left or right hand manifold bank may be designated "Duty" and the should automatically changeover to supply the distribution system from the 'Standby" bank when pressure in the "Duty" bank falls to a pre-determined level.

There should be a 2 stage duplex system to provide a high flow rate. Each side of the should be

capable of being fully isolated, via a full flow ball valve, in order to change any regulator without a cessation of supply. The inlet of the 1st stage regulators should be protected from the particulate matter by a moulded bronze filter.

All regulators should be protected from over-pressurization by relief valves which are vented to atmosphere. There should be a bypass valve fitted to the 2nd stage regulators to allow nitrous oxide to be vented outside the manifold room during the commissioning stage. Regulators shall comply with BS EN ISO 10524-2 and shall have documented test reports available confirming successful completion of the oxygen ignition tests stated therein. Multi stage regulators combined into single unit is not acceptable.

To simplify installation there should be an installation bracket attached to the wall with four screws; the main panel then should locate on to this bracket and be secured. The Control Panel should be housed in a single panel having a solid construction using epoxy technology in a glass reinforced polymer moulding for high strength, high chemical and corrosion resistance. The cover should hinge upwards but should remain facing outward for manual operation and maintenance accessibility.

For added safety the voltage inside the panel should not exceed 12v dc. The mains supply transformer should be in its own housing in a moulded recess at the rear of the panel.

There should be a fail safe system in the event of power failure so that solenoid valves open and there is full continuity of supply pressure and flow. Upon power restoration the unit should revert back to the original bank of cylinders being used.

To avoid inadvertent resetting of the change cylinder alarm the solenoid valves should be latched to that once changeover has occurred and the cylinders replaced a reset button must be operated to cancel the alarm condition.

To aid maintenance the copper connections within the panel should be flat face /'O' ring design and facilitate easy removal of the regulators and pressure switches. There should be manual changeover buttons so that servicing either side of the system can be simply achieved. The PCB's should be linked with plug and socket connectors for easy removal.

The standard range of manifold control systems are 'CE' marked under the Medical Devices Directive (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

2.2 **Emergency N2O System 2 cylinders with Test point: (Imported)**
(Shall comply to HTM 02-01)

Emergency Reserve Manifold

The Emergency Reserve Manifold shall conform to NHS Health Technical Memorandum No.02-01 (HTM 02-01), BS EN ISO 7396-1, BS EN ISO 15001 and BS EN ISO 10524-2. The manifold control system shall provide an uninterrupted supply of a specific medical gas from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators,

providing a constant nominal downstream pipeline gauge pressure of 400 kPa, 700 kPa or 1100 kPa. The Emergency Reserve Manifold shall be supplied fully assembled and tested. A Gem 10 terminal unit test point shall be fitted, which shall be isolated from the main supply with a ball valve. The manifold shall be supplied with a non-return valve for connection to the distribution system, enabling a continuous supply of gas to the distribution system upon failure of the normal supply. To simplify installation the complete manifold fitted to a wall mounting plate attached to the wall with four screws.

Pressure Regulation

There shall be two separate stages of pressure regulation to enable high peak flow rates without a significant reduction in downstream pressure. Multistage regulators combined into a single unit are not acceptable. The inlet of the 1st stage regulator shall be protected from the particulate matter by a 25um sintered brass filter. Sintered aluminum bronzes shall not be used.

Regulators shall comply with BS EN ISO 10524-2 and shall be supplied with documented test reports upon request, confirming successful completion of the oxygen ignition tests stated therein. The manifold control system shall capable of supplying a flow of 1000 1/min to a nominal 400 kPa distribution system, 1350 1/min to a nominal 700 kPa distribution system and a flow of 1800 1/min to a nominal 1100 kPa distribution system based on a 10% reduction in flowing pressure from a static pressure set point. All regulators shall be protected from over pressurization by relief valves that are vented to atmosphere.

Materials

All polymers and elastomers in the gas flow that can be subjected to working pressure greater than 3000 kPa shall be halogen-free. The use of PTFE, PCTFE, Viton and other halogenated polymers in these applications is strictly prohibited. Non-return valves fitted to header manifolds shall have a metallic seat with ceramic ball. Soft seat non-return valves utilizing polymers or elastomers are not acceptable.

Emergency Reserve Manifold Operation

Either the left or right hand of the manifold bank shall be designated as “Duty”, with the other manifold bank being designated as “standby”. When the bank pressure in the “Duty” bank falls to 68 bar (14 bar for nitrous oxide), a “Reserve Low” or “Reserve Fault” alarm condition shall be initiated by a contract pressure gauge, which shall be indicated on the relevant medical gas central alarm panel and/or primary supply automatic manifold panel. The “Standby” bank shall also be provided with a contact pressure gauge, such that any leakage of gas over an extended period of which causes the pressure in the standby bank to fall bellow 68 bar (14 bar for nitrous oxide), will also initiate a “Reserve Low” or Reserve Fault” alarm condition.

Non-return valves shall be fitted to each tailpipe connection point to protect the system in the event of a tailpipe fracture.

Corner connectors shall be available to enable installation of manifold headers around corners of the manifold room. A custom length corner connector shall also be available to enable header

manifolds to be installed in a 'U' configuration across 3 adjacent walls of a manifold room.

CE Marking

The standard range of Emergency Reserve Manifolds are 'CE' marked under the medical Devices Directive (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

Modular Header manifolds

Modular header manifolds shall provide connection points for flexible cupronickel tailpipes. 'Secondary' headers shall connect directly to the manifold control system with extensions for additional cylinders being provided by the addition of further headers. The assembly should consist of -2 cylinder x 6 cylinder connection. The Reserve /Standby Manifold should consists of a certainlly mounted regulator Emergency supply Manifold. The cylinder capacity per bank should be increased by installing the required number of Modular Manifold headers and racks.

3.0 MEDICAL COMPRESSED AIR SUPLY SYSTEM – IMPORTED (Shall confirm to HTM 02-01 Standard)

Combined Medical and Surgical Air with minimum 1400 Liters/ minute output at 8.5 bar of each compressor

The combined Air System shall conform to NHS Health Technical Memorandum HTM 02-01. Medical quality for supply of the hospital surgical and medical (via separate regulators) air systems. Two Nos compressor configurations. Each compressor should be capable of supplying minimum 1400 LPM at 8.5 bar.

Compressors

Compressors shall be oil injected rotary screw compressors suitable for both continuous and frequent start/stop operation at a nominal outlet pressure of (8.5 bar) Compressor shall be supplied with a block and fin style after cooler with a dedicated quiet running fan to maximize cooling and efficiency. A multi-stage oil separator capable of achieving 2ppm oil carry over shall be fitted to minimize contamination and maintenance. EFF1 (CEMEP) rated TEFC, IP55 class F electric motors shall be used and incorporate maintenance –free greased for life bearings. Motors with lower efficiency ratings are not acceptable. Each screw compressor shall be supplied with an intelligent user interface to digitally display service and warning indication, working pressure, operating temperatures, number of motor starts, on-load running hours and total running hours. Compressors are to be individually hard-piped to the receiver manifold as standard.

Dryer /Filter/Regulator System

The duplexed filter and dryer module shall incorporate high efficiency water separators, oil filters, heatless regenerative desiccant dryer, dust/activated carbon filters, hopcolite filters and bacterial filters with autoclavable element. Contaminants in the delivered air downstream of the

bacterial filters shall be maintained at levels below those shown in the following table:

Containment	Threshold
H2O	115ppm v/v
Dry particulates	Free from visible particulates in a 75 liters sample
Oil (droplet or mist)	5 ppm v/v
CO	5 ppm v/v
CO2	500 ppm v/v
SO2	No Light Defined
NO	No Light Defined
NO2	No Light Defined

The dryer control system shall incorporate an energy Management system that shuts ff purge air when no compressors are running.

Control System

The central control system shall provide an intelligent human machine interface incorporating on board flash memory and real time clock for recording operational parameters in the in built event log. The central control system shall operate at low voltage and include BMS connection for commont fault. Visualisation of plant inputs, outputs and status through a web browser, using a simple Ethernet connection shall be available. The central control unit shall incorporate a user friendly 5.7" high-definition colour display with clear pictograms and LED indicators, providing easy access to system operational information.

Optional Control Equipment

An advanced monitoring system shall be available to give immediate access to valuable information such as system status, trends, historical data and system performance. Data collected from all pumps shall be made available in real-time visualization pages and shall be accessed through the hospital's LAN, such that total data security is assured. The Airconnect" monitoring system shall also include:- Logging and trending for an accurate performance status of your system . * Desktop even notification to avoid constant status checking. * E-mail and SMS event notification for additional convenience.

Receiver Assembly

Air receivers shall comply with BS EN 286-1, supplied with relevant test certificates. Total receiver capacity of minimum 4000 liters with maximum working pressure of 11 bar shall be hot dip galvanized inside and out and fitted with a zero loss electronic drain valve. Float type drain valves are not acceptable. The receiver assembly shall be fitted with a pressure safety valve capable of passing the maximum flow output of the compressor at 10% receiver overpressure. The receiver shall be further protected by a fusible plug and include a pressure gauge.

Dew Point monitoring

The dryer shall incorporate a ceramic dew point hygrometer with an accuracy of ± 10C in the range -20 to -80^0 C atmospheric dew point and 4-20mA analogue output. Aluminium oxide or palladium wire sensors are not acceptable. An alarm condition shall trigger on the dryer control panel if the dew point exceeds a -460C atmospheric set point. The plant control unit shall incorporate a multi-function LCD displaying, amongst other things, the dew point of the delivered air to enable monitoring of the air quality by the hospitals estates department. Volt free contacts shall be included to enable the dew point alarm signal to be connected to a central medical gas alarm system and / or building management system (BMS). To enable periodic calibration of the dew point sensor element, the hygrometer shall be remotely connected downstream of the dryer via a micro-bore tube. It is not acceptable to install the sensor directly into the medical air supply pipeline.

4.0 MEDICAL VACUUM (SUCTION) SUPPLY SYSTEM (IMPORTED) (Shall confirm to HTM 02-01 Standard)

Medical Vacuum

The Medical Vacuum System shall conform to EN ISO 7396-1 and NHS Health Technical Memorandum No.02-01 (HTM 02-01). The Medical Vacuum System shall ensure the minimum pipeline vacuum level of 450mm Hg is maintained at the pant service connection point at the rated volumetric 'free air' flow rate with One pump in standby. The bacteria filtration system shall be 'duplexed' such that each filter can be isolated for replacement of the filter catridge.

Vacuum Pumps

Vacuum pumps shall be air-cooled, oil lubricated rotary vane type consist of 2 (Two) pumps to produce 6000 liters/ minute (each pump at least 3000 LPM outlet), fully compliant to HTM 02-01 suitable for both at nominal inlet vacuum levels of between 578mmHg and 728mmHg. Composite carbon fibre rotor blades shall be fitted to minimize the cost of maintenance. Rotors shall be driven by directly coupled TEEV electric motors. Pump inlets shall include a wire mesh filter and integral non-return valve to prevent oil such back and pressure increases in the vacuum system. Each vacuum pump shall have an integral separator filter to ensure a virtually oil-free exhaust. Each pump shall be fitted with anti vibration pads between the pump foot and mounting frame.

Bacteria Filters

The duplex bacteria filter system shall incorporate high efficiency filter elements. A differential vacuum indicator shall be installed across the filter to indicate blockage. Additional pressure sensors shall be installed at the inlet and outlet of the filter to measure the pressure drop across the filters. Each filter shall be designed and sized to carry the full plant design flow capacity with a pressure drop not exceeding 33mbar (25mmHg). Bacterial Filter elements shall have penetration levels not exceeding 0.005% when tested by the sodium flame method in accordance with BS 3928:1969 and utilizing particles in the 0.02 to 2 micron size range. Drain flasks shall be connected to each filter. Drain flasks shall be manufactured from transparent Pyrex* with a

polymer coating on the inner and outer surfaces in order to maintain a seal in the event of inadvertent breakage of the Pyrex* flask. All drain flasks shall be suitable for sterilization and be connected via a manual isolating valve.

Control System

The central control system shall provide an intelligent human machine interface incorporating on board flash memory and real-time clock for recording operational parameters in the in built event log. The central control system shall operate at low voltage and include BMS connection for common fault. Visualization of plant inputs, outputs and status through a web browser, using a simple Ethernet connection shall be available. The central control unit shall incorporate a user friendly 5.7" high-definition color display with clear pictograms and LED indicators, providing easy access to system operational information. Cascading of vacuum pumps shall be achieved by measuring the vacuum level at the plant inlet with a pressure transducer. A mechanical back-up facility shall ensure continued operation in the event of a control system malfunction. The control system shall normally employ automatic rotation of the lead pump to maximize pump life and ensure even wear.

Optional Control Equipment

An advanced monitoring system shall be available to give immediate access to valuable information such as system status, trends, historical data and system performance. Data collected from al pumps shall be made available in real-time visualization pages and shall be accessed through the hospital's LAN, such that total data security is assured. The Air connect"monitoring system shall also include:-

- Logging and trending for an accurate performance status of your system.
- Desktop event notification to avoid constant status checking.
- E-mail and SMS event notification for additional convenience.

Vacuum Receiver(s)

Vacuum receiver(s) total receiver volume of minimum 4500 liters shall be supplied with relevant test certificates and have a total volume of at least 100% of the plant output in 1 minute in terms of free air aspired at normal working pressure. Each vacuum receiver shall be hot dip galvanized inside and out.

CE Marking

The standard range of Medical Vacuum plant systems are 'CE' marked under the Medical Devices Directive (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

5.0) MEDICAL ANAESTHETIC GAS SCAVENGING SYSTEM – Imported, Certified/ Complied as per HTM 2022 and CE Marked.

The Duplex Medical Vacuum System must be fully compliant with the latest International

Standard HTM 2022 and Specifications as mentioned in the special clause for manifold system and will be suitable for anesthetic gas scavenging for six number operation Theatres. One pump will be standby with the other in operation.

The Anesthetic Gas Scavenging disposal system will be a dedicated, specifically designed active extraction and disposal system for waste anesthetic gas. The system will conform to the requirements of British Standard 6834:1987 and will be capable of providing a flow rate between a maximum of 130 L/min. with a 1 kPa resistance to flow and a minimum of 80L/min. with a 4 kPa resistance to flow at each terminal unit, irrespective of the number of terminal units in use.

The ensure that maximum patient safety is achieved the terminal unit will be designed with a choked-office to prevent a flow rate exceeding 150 L.min.

To allow balancing of the terminal unit flows during initial set up there will be three sizes of choked orifice available; a black orifice 3.9mm dia., a white orifice 4.0mm dia. and a red orifice 4.1mm dia.

The AGS plant will be skid mounted and included on the skid will be the simplex exhauster unit(s), a motor control unit with starter/isolator, moisture drain flask and flexible connector(s) to connect the plant to the pipeline. Exhauster units are electrically driven and there will an option of a single or three-pase motor.

All remote start switch panels will incorporate a green indicator light, which illuminates when the exhauster unit is selected operating. The system will be activated by remote switches that indicate the system is running and the system will be static when not in use.

The standard range of AGS disposal systems and terminal units are 'CE' marked under the medical Devices Directive. Under this directive, the specified products are classified as class IIa Medical Devices.

6.0) **Medical Gas Master Alarm (Imported)**

Medical Gas Central Alarm System

The Central Alarm system is a flexible, customizable medical gas central alarm system. The alarm shall be capable of carrying up to fifteen gas services, and can consist of up to thirty-two panels, including any relay interfaces. The medical gas central alarm shall fully comply with the requirements of HTM2022, HTM02-01, C11, BS EN 60601-1-2 and BS EN ISO 7396-1.

The cover, back box and bezel (if required) shall be polyester powder coated in a RAL9010 30% gloss finish. A single tamperproof fastener shall be used to gain access to the hinged door. The hinge shall operate through a minimum of 120^0 to provide adequate access.

System operation

Configuration of the central Alarm shall be done via switches on the panel, allowing easy and flexible configuration. Each panel shall display and / or input up to five gas services or up to

twenty point alarms.

Each gas service shall consist of a bank of five dual-circuit LED indicators, one green (for a "Normal" indication) and three yellow and one red (for four input conditions) as standard, although panels shall be customizable for individual requirements. The gas service inputs shall be connected to a five way connector block.

The alarm shall monitor the cable connection from the source equipment, and provide a fault alarm in the event of a short circuit or open circuit fault. This shall be distinguishable from a source equipment fault.

There shall be a test facility to check the integrity of all the LED indicators on the panel, and the audible alarm. The test facility shall also provide diagnostic information to aid in fault finding.

An adjustable volume audible alarm shall be fitted to the panel to allow installation in all environments, and there shall be a facility to connect the alarm to a remote sounding unit to repeat the audible alarm at other locations, for example a nurse base at the other end of a ward. There shall be a mute facility which silences the audible alarm for a period of fifteen minutes, or until another alarm condition occurs. There shall be a selectable option to indicate to other repeater panels around the system that an alarm condition has been acknowledged and appropriate action is being taken.

A volt free contact shall be provided to output normal/fault status for the panel.

Panel Operation

Each panel shall be wired on to a dedicated data transmission cable and shall be permanently connected to the "Essential Supply" within the hospital via a 3A fused spur.

Each gas service will display a green 'Normal" indication when all four conditions are not in a fault condition. When an input condition faults, the respective LED shall indicate the type of failure.

Any data communication errors shall cause a "System Fault" alarm in the event of a power failure.

Source equipment shall connect directly to the input alarm panel, it is not acceptable to install a separate connection box to convert switch signals to a data sngla.

CE Marking

Medical Gas Central Alarms shall be 'CE' marked under the Medical Devices Directive. (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

7.0 Medical Gas Area Alarm – Imported

Each medical gas area alarm panel shall be capable of monitoring 6 medical gas services by means of pressure sensors, which detect deviations from the normal operating limits of either pressure or medical vacuum. The medical gas area alarm shall fully comply with the requirements of HTM2022, HTM02-01, C11, BS EN 60601-1 and BS EN ISO 7396-1.

The cover, backbox and bezel (if required) shall be polyester powder coated in a RAL9010 30% gloss finish. A single tamperproof fastener shall be used to gain access to the hinged door. The hinge shall operate through a minimum of 120^0 to provide adequate access.

System Operation

Each gas service shall be displayed by coloured LED's to show 'Normal' (green), 'Low' and 'High Pressure' (red) conditions. Medical vacuum systems shall be displayed in the 'Normal' (green), and Low Vacuum' (red) conditions only. Failure indicators shall be displayed by flashing lights and normal indications shall be steady. Each LED block indicator shall be a plug-in component with individual long life LED's connected in paralled in two banks to provide duplex circuits.

The audible warning shall sound simultaneously with any failure indication and a mute facility shall be provided. Following a mute selection the audible will resound after approximately 15 minutes , or shall operate simultaneously should a further alarm condition occur. A "Mute" switch shall be provided inside the panel; for use during any maintenance resulting in prolonged pipeline or plant shutdown. This facility shal automatically reset when the gas service returns to normal.

The alarm panel shall have a 'Test' facility to prove the integrity of the internal circuits, LED's and audible warning. The alarm panel shall incorporate a volt free normally closed relay to allow for interconnection to either a medical gas central alarm system or an event recording circuit of a building management system.

Each alarm shall provide a green LED to indicate that electrical power is available at the panel and a red LED to indicate 'System alarm',. In the event of an electrical power supply failure the 'System alarm' LED shall illuminate (flashing) and the audible warning shall be delayed for 20 seconds to enable standby generator tests.

Line contact monitoring circuits shall be provided to constantly monitor the integrity of the input sensors and interconnecting wiring. In the event of any fault the line contact monitoring circuits shall initiate the specific gas service failure indication, a 'System Alarm' indication and an audible warning. Further aids to fault diagnosis shall be provided by means of varying flashing rates whilst operating the 'Test' switch.

Pressure and Vacuum Switches

Pressure and vacuum switches shall be manufactured with brass wetted parts and house a PCB with line contract monitoring resistors. Electrical connectors shall be designed for frequent disassembly. Spade connectors are not acceptable. Pressure switches shall include both high and low pressure settings in the same switch, using only a single ¼" BSPP threaded pipeline connection to minimise the number of sealed joints. The body and housing of the pressure switch shall be manufactured from impact resistance, rigid and inherently corrosion proof materials. Elastomers and plated or coated mild steel are not acceptable materials.

Pressure switches shall connect directly to the area alarm panel, it is not acceptable to install a separate connection box to convert switch signals to a data signal.

CE Marking

Medical Gas Area Alarms are 'CE' marked under the Medical Devices Directive. (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

8.0 Medical Area Valve Service Unit with valves, should comply to HTM02-01 (Imported)

The ZSU^2 (also known as a Area Valve Service Unit – AVSU) shall conform to BS EN 739:1998, HTM 02-01 and BS EN ISO 7396-1:2007. The ZSU^2 shall provide a zone isolation facility, for use either in an emergency or for maintenance purposes. It shall also provide a physical barrier (spade) shall be capable of insertion when require on either side of the valve, without the need to totally dismantle the line valve. During normal service, full-flow gaskets with an 'O' ring groove on one side shall be colored white and provide sealing between the flat face connector and ball valve. The line valve shall be brass 22mm or 28mm ball valve with PTEE seals/seats, operated by a quarter turn handle with over-travel prevention in both directions. The ball valve shall connect by 22mm or 28mm copper stub pipes to the distribution system. The assembly shall be housed in a valve box, which shall be capable both surface and concealed installation. The box shall mdae from extruded aluminium with die-cast aluminium end caps to prevent corrosion, offer high, strength, and resist high temperatures from brazing in close proximity. The box shall be finished in RAL 9010 polyester powder coat finish. A hinged door shall lock in the closed position and ZSU's installed adjacent to each other shall be operated by different key/lock combinations. The ZSU^2 door shall open through a minimum of 160^0 to provide maximum access, and provide for natural ventilation to prevent build up of gas within the valve box. A blank zone identification label shall be provided with each ZSU2 2^{nd} fix assembly. Each ZSU2 assembly shall be factory tested for gas tightness.

Emergency Access

The 2^{nd} fix shall include a transparent plastic window incorporating the words 'Pull in Emergency and Close Valve'. In order to gain access in an emergency, a ring pull shall be fitted to the removable portion of the window. The emergency access mechanism shall be safely operable by a 5^{th} percentile woman without the use of a tool. Glass windows shall not be used. It

shall not be possible to refit or reset the means of emergency access.

Door Tamper Alarm

A door tamper alarm facility shall be available, with a reed switch initiating a system alarm indication on the local alarm panel when the emergency access window is removed. Normally only oxygen and medical air ZSU^2's controlling high acuity care areas, resuscitation bays and accident and emergency wards shall be fitted with the door tamper facility.

Materials

The second fix assembly shall be manufactured from fire retardant V0 rated ABS. All wetted parts (except seals and gaskets) shall be brass or copper. Copper stubs pipes shall be manufactured from phosphorous de-oxidised non-arsenical copper to EN 1412:1996 grade CW024A, manufactured to metric outside diameters in accordance with BS EN 13348:2008 R250 (half hard). Rubber pipe grommets shall be provided to ensure any leaking gas does not escape from the box into a wall cavity. All elastomeric gas seals shall be manufactured from viton with a Shore hardness of 75. Mild steel components shall not be used. Sacrificial protection (e.g. galvanizing), passivation or painting shall not be used to provide corrosion protection. Materials shall be inherently resistant to corrosion.

Gas Specific Connections

The ZSU^2 shall be fully gas specific and labeled to identify the medical gas service. The gas specific shrouds shall clearly show the gas service and use colour coding to BS EN 739:1998. Shrouds shall be pin indexed such that the only the correct shroud can be fitted to each 1^{st} fix. Gas specific NIST connections to BS EN 739:1998 shall be incorporated on each side of the line valve and include a permanently fitted gas identification label. Pressure gas service (not vacuum) NIST connections shall incorporate 100% self sealing valves which, held closed by gas pressure until insertion of the appropriate gas specific male NIST fitting. Additional sealing of NIST fittings shall be achieved using blank NIST nuts, with a knurled outer diameter. The blank NIST nuts shall include an internal 'O' ring groove and 'O' ring to seal on the smooth outer diameter of the female NIST. Blank NIST nuts shall be hand tightened only. Each NIST connection shall be capable of providing a free air flow rate of 300 1/min with a pressure drop of 0.4 bar from a 4 bar nominal inlet pressure.

Local Alarm Pressure Switches

The ZSU^2 shall incorporate minimum leak pressure switch connection ports on the left and right hand sides to enable installation of a line pressure switch inside the box.

CE Marking

The standard range ZSU^2 's are 'CE' marked under the Medical Devices Directive. (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIa medical Devices.

9.0 Medical Line Ball Valves shall comply to HTM 02-01 – Imported

Line Ball Valves c/w NISTS

Medical gas line ball valves complete with lockable NIST connections and banking spade shall be provided as a means of isolation on medical gas pipelines at positions specified in the medical gas pipeline system design. Line ball valves assemblies shall comply with NHS Health Technical Memorandum 02-01 (HTM02-01). Valves shall operate from the fully open to the fully closed position by manual operation of a lever through 90^0. Valve nominal bores shall be equal to the nominal pipe work size. All line ball valves shall be cleaned for oxygen service. Smaller type V assemblies (15 to 54mm inclusive) shall have flat-face connectors with 'O' ring seals. The larger VF type 976 to 108mm inclusive) shall be flanged and installed with stainless steel bolts, nuts and spring washers with 3mm Viton O sealing gaskets. PTFE tape or any other thread sealing media is not acceptable. Each Medical gas line ball valve assembly shall terminate in copper stub pipes to enable brazing direct into the distribution system using the flux less brazing technique. Valve assemblies shall incorporate a sliding lock mechanism on the handle, which can be locked in either the open or closed position using a standard padlock with a 6mm (1/4") diameter shackle. NIST blanking nuts shall be capable of being padlocked onto the NIST bodies.

Materials

Medical gas line ball valve assemblies shall be constructed in a two-piece full-bore design with brass body, Teflono ball seals, stem packing seal, stem 'O' ring seal and a hard-chrome plated brass ball. Vales shall be designed to have a tight shut-off and blow out proof stem for protection against pressure surges.

Copper stub pipes shall be manufactured from medical grade copper pipe to BS EN 13348:2001. Copper stub pipes shall be of sufficient length to enable brazing directly into the distribution system without the need for disassembly on site.

Testing

All ball valve assemblies shall be pressure tested for valve tightness and leakage prior to packing and shipping.

Performance

Nominal bore (mm)	Torque (Nm)	Working Pressure (bar)	Overall Length (mm)
15mm	5.4	55	580
22mm	8	50	620
28mm	10	45	680
35mm	14	40	730
42mm	20	35	870
54mm	33	30	900

CE Marking

The standard range of line ball valves are 'CE' marked under the medical Devices Directive 93/42/EEC with approval from notified body no.0088 (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIa Medical Devices.

10.0) **Medical Terminal/ Gas Outlets (Imported)**

Shall comply to HTM 02-01

The medical gas terminal units shall conform to BS EN ISO 91701:2008 and accept probes to BS5682:1998. Terminal units shall be capable of single-handed insertion and removal of the medical gas probe. The anaesthetic gas scavenging (AGS) terminal unit shall conform to BS6834:1987. The wall mounted first fix assembly shall consist of brass pipeline termination block with copper stub pipe secured between a back plate and a gas specific plate to allow limited radial movement of the copper stub to align with the pipeline. The gas specific plate shall be fixed to the backplate by means of a tamperproof clip-fit mechanism. The first fix shall incorporate a maintenance valve (except for vacuum) and a test plug. The test plug shall provide an effective blank to enable carcass pressure testing. The second fix plastic components shall be manufactured with the pin index permanently moulded into the gas specific socket. The socket assembly shall retain a capsule assembly, containing the check valve and probe 'O' ring seals.

The replaceable capsule assembly shall enable all working parts subject to wear through usage to be replaced as a factory tested assembly, thereby reducing maintenance time. Each termination block assembly shall be pressure tested by the pressure decay method.

Gas Specificity

Terminal units shall be gas specific and only accept the correct medical gas probe. Gas specific components shall be pin-indexed to ensure that a correct gas specific assembly is achieved so that in normal course of dismantling for repair or maintenance, parts from other gases cannot inadvertently be used. Wall mounted terminal units shall incorporate an anti-rotation pin to engage with connected downstream medical equipment ensuring correct orientation.

Materials

All screws, probe roller pins, locking springs and the anti-rotation pin shall be manufactured from stainless steel. The second fix assembly shall be incorporate three injection moulded parts in fire-retardant nylon 66. All wetted parts (except seals) shall be brass or copper. Copper stubs pipes shall be manufactured from phosphorous de-oxidised non-arsenical copper to BS EN 1412:1996 grade CW024A, manufactured to metric outside diameters in accordance with BS EN 13348:2001 R250 (half hard). All elastomeric seals shall be manufactured from viton with a shore hardness of 75.

Antimicrobial additive

All users accessible parts, 2nd fix, gas ID ring, plaster box, fascia cover and inks shall include a silver antimicrobial additive for inherent antimicrobial protection.

Sample	Species	Reduction
Gas ID Ring	E coli	≥ 99.50%
Gas ID Ring	MRSA	≥ 99.52%
Plaster Box	E coli	≥ 99.94%
Plaster Box	MRSA	≥ 99.35%

Pipeline Connections

Terminal units installed in walls, bedhead panel, headwalls or fixed pendants shall be connected to the pipeline with a copper stub pipe. Pressure gases and vacuum shall incorporate a 12mm copper stub pipe with a swaged end for direct connection to a 12mm O/D copper tube without the need for en extra fitting, thereby requiring only a single brazed joint to be made. Terminal units for anaesthetic gas scavenging shall incorporate a 15mm O/D copper stub pipe.

Terminal units installed in booms or moveable pendants shall be attached to their respective flexible gas hose by a gas specific non-interchangeable screw thread (NIST) fitting to BS EN 739:1998. Terminal units shall be fitted with a male NIST and nut for connection to hoses with a female NIST connection.

Performance

Pressure drops across the terminal unit shall comply with clause 4.4.11 of BS EN ISO 9170-1:2008. The flow /pressure drop characteristics for the Gem 10@ are shown below with the maximum allowable value.

Nominal Pressure (kPa0	Test Pressure (kPa)	Flow (i/min.)	EN 9170-1 limit kPa	Gem 10 (kPa)
400-500	320	40	15	0.6
400-500	320	200	70	14
700-10000	560	350	70	30
vacuum	*40	25	15	1.1

CE Marking

The standard range of Gem 10@ Medical Gas Terminal Units and Gem 10@ Conversions are 'CE' marked under the Medical Devices Directive. (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIb Medical Devices.

11.0) **Medical Probe/ Adaptor for Medical Gas Outlet Points – "Imported"**
Matching probes with one end suitable for Medical Gas Outlet Point & other end suitable for hose. The probe should comply with BS 5682:1998 for gases & Vacuum & BS 6834:1987 for AGS.

12.0) **Oxygen Flow meter & Humidifier Bottle- "Imported " with CE Mark**

The flow meter should be CE marked

Flow meter will be supplied with imported plastic transparent, reusable humidifier bottle with high pressure release.

- High strength Plastic colour coded body
- Polycarbonate outer tube with relief valve (Blow off pressure approximately 90 p.s.i)
- Inner tube manufactured from anti-static material
- Calibrated 1-15 literes per minute flowrates @ 60 p.s.i input pressure
- Supplied with integral oxygen probe or 3/8"BSP coned connector
- Flow accuracy $\pm$ 10% of the indicated value or 0.5 Ipm whichever is the greater (in accordance with ISO 15002:2000)
- Standard male DISS (nebulizer) outlet thread
- Coloured ring indicating year of manufacture
- Flush flow with valve fully open in excess of 45 Ipm
- Adaptors available to convert male to female outlet.

HUMIDIFIERS

225cc 'Bubble Through' Humidifier – Autoclavable
Male thread to connect directly into flow meter outlet.

13.0) **Ward Vacuum Unit – "Imported" with CE Mark**

Vacuum Regulator should have the following:

The product should meet all of the requirements of the latest BS and ISO Standards (BS 7259 1992) and ISO 10079 (1992).

The Design should ensure minimum servicing and a lifetime of trouble free operation.

The vacuum settings for High suction should be 0-500 mm Hg & for Low 0-150mm Hg (Relief valve at 180 Hg for Low suction).

The controller shold be operated by means of a 180 degree on / off switch and a bonnet adjustment.

The controller should have a dual spring control and a rolling diaphragm, to provide extra Sensitivity in control.

It should be of high quality polysulphone to provide extra strength against damage.

The high and low units are fitted with pipeline protector, as standard to guarantee against Contamination of the hospital pipeline system.

Suction Jar should have the following:

The minimum 1700 ml Suction Jar should be manufactured in polysulphone and capable to autoclave up to 160 degree C.

It should have an integral "V" socket, and the lid should be fitted by means of a "Pressure cooker" type Bayonet fitting.

All seals and splatter tube should be in silicone for long life.

The filter trap in the jar will be designed to ensure maximum efficiency in preventing overflow and in corporates design features to ensure the breakdown of foam.

14.0) **Theatre Suction Unit – "Imported" with CE mark**

A sturdy 3 foot trolley with 5 castor base complete with angled high suction controller. The unit will be powered from the medical vacuum supply and with 5 meter of vacuum hose and matching probe suitable for vacuum outlet. It should have two inimum each 1700 ml polysulphone secretion jars with below mentioned specifications.

Vacuum Regulator should have the following:

The product should meet all of the requirements of the latest BS and ISO Standards (BS 7259 1992) and ISO 10079 (1992).

The Design should ensure minimum servicing and a lifetime of trouble free operation.

The vacuum settings for High suction should be 0-500mm Hg & for Low 0-150mm Hg (Relief Valve at 180Hg for low suction)

The controller should be operated by means of a 180 degree on /off switch and a bonnet adjustment.

The controller should have a dual spring control and a rolling diaphragm, to provide extra Sensitivity in control.

It should be of high quality polysulphone to provide extra strength against damage.

The high and low units are fitted with pipeline protector, as standard to guarantee against Contamination of the hospital pipeline system.

Suction Jars should have the following:

The 2 x 1700 ml (minimum) Suction Jar should be manufactured in polysulphone and capable to autoclave up to 160 degree C.

It shoud have an integral "V" socket, and the lid should be fitted by means of a "Pressure cooker" type Bayonet fitting.

All seals and splatter tube should be in silicone for long life.
The filter trap in the jar will be designed to ensure maximum efficiency in preventing overflow and in corporates design features to ensure the breakdown of foam.

15.0) **High pressure tube – "Imported".**

It should be imported colour coded for individual services i.e. white for Oxygen, Blue for N2O, Black for Air & Ye3llow for Vacuum, antistatic rubber tube, as per ISO standards and CE marked.

16.0) **BED HEAD PANEL - HORIZONTAL (For High Equity Areas) (Imported) (Shall confirm to HTM 02-01 Standard)**

The medical Bed Head Panel system should provide a safe, efficient means of delivering services to patients / staff in both general and special care applications.
The headwall system shall be constructed from custom designed extruded aluminium sections with Zentec steel fascia panels faced with a customer specified high-pressure laminate to EN 438-1-2. All visible aluminium surfaces shall be powder coated RAL9010 60% gloss by a DuPont/Akzo Nobel approved powder coating specialist, offering a minimum guaranteed service life of 25 years. End caps shall be manufactured from 3mm thick UV stabilized and fire retardant high –impact Fabex 578. A removable UV stabilized polymer extrusion shall cover all fixing screws, providing a tight seal to prevent dust traps, UV stabilized PVC wall seals shall run the full length of the headwall, providing a dust tight seal between the sides of the headwall system and the wall. Segregated service compartments shall run the length of the headwall to carry medical gas pipes, low –voltage electrical cables and ELV/data, with segregation of service being maintained throughout,. Each headwall unit shall be supplied pre-piped, wired and certified.
The design and configuration of the headwall shall fully comply with all relevant applicable standards, including HTM 2007, HTM 2011, HTM 2015, HTM 2020, HTM 02-01, HTM 2022, BS EN ISO 1197, EN60601-1, BS6496, BS 7671, BS EN 60439, IEC 60364-7-710.

Medical Gases

The compartment for housing medical gas services shall be capable of running 3 pipes of 15mm diameter with axes on a common vertical plane to facilitate simple on-site brazing to the piped distribution system. Copped pipes shall be manufactured from phosphorus de-oxidized non-arsenial copper to BS EN 1412:1996 grade CW024A and be manufactured to metric outside diameters in accordance with BS En 13348:2001R250 9half hard). Degreasing of pipe shall be such that there is less than 20 mg/m2 (0.02mg/cm2) of hydrocarbons on the degreased surface when tested by the method specified in ASTM B280 clause 12.

Lighting:

Diffusers shall be manufactured from extruded fire-retardant Lexan ML 3290 poly carbonate resin, incorporating prismatic inner surfaces to maximize efficiency of light distribution from the chosen source. Efficiency shall be further enhanced by the use of mirror finish reflectors manufactured from Alanod Miro4 or Miro27 aluminium, achievig a minimum clarity and total

reflection to TR-2 or DIN 5036-3 of 95%.
Luminaries shall be provided with electronic ballast's suitable for use with TLS high efficiency fluorescent tubes, with a power factor rating of atleast cos0 = 0.93. Lighting control shall be local or remote control.

Electrical Sockets

Electrical sockets shall normally be fitted in the side panels of the headwall, with additional sockets being fitted to the front fascia panel as required. Electrical sockets shall be wired in ring or radial mains to circuits as specified by the customer.

Communications

Provision for, or fitting of the nurse call system shall be co-ordinated by the headwall supplier. Data sockets including, but not limited to RJ 45 and telephone sockets shall be installed in the headwall at the time of manufacture.

Medical Equipment Rail

Medical equipment rails shall be designed in accordance with BS EN 12218:1999, manufactured from a hollow rectangular stainless steel profile of 30mm high by 10mm deep. It shall be possible to retrofit further medical rails to the bedhead unit after installation without the need for power tools and without the need to disrupt the continuity of services provided by the bedhead unit.

The panel system meets the following criteria:

- Modular design of aluminium extrusions
- Compliance to HTM2015, 2022, European and ISO standards.
- Ability to house UK, US and other European medical gas terminal units and electrical sockets.
- Smooth curved surfaces, no visible screws and choice of coloured décor stripe.
- Ease of installation via separate rail-bracket or wall mounting plates.
- Easy removal of covers for maintenance and pipeline connection.
- Option of an integral medical rail a part of the modular extrusion design.

Modular Design

- The panel system should consist of a number of modular extrusions capable of being joined together to form a carcass to suit the particular application. An optional medical rail extrusion can be added as an integral part of the panel carcass. The medical rail profile (10mm x 30mm) should comply with the forthcoming European standard pr EN 12218 and accept most clamps currently on the market.
- Segregation of service i.e. extra lox voltage (<48 volts), low voltage (<600 volts but >48 volts) and medical gases, should be maintained throughout. Individual modular front plates, should be removed with a special tool, and allow easy access for service.

Standards

- The panel system should be manufactured in accordance with BS EN 793 for "Medical Supply Units" the forthcoming international standard, ISO 11197. All units comply to HTM 2015 and 2022 and to the latest edition of the IEE and NEC regulations. The panel is 'CE' marked under the Medical Devices Directive 93/42/EEC with approval from notified body no.0301 (BVQI). Under this directive, panel is classified as a Class IIa Medical Device.

Appearance

- The panel system should have a smoothly curved top and pipeline covers and the option of a coloured décor stripe. The aluminium extrusions should have a polyester coating finish on all external surfaces. The medical rail profile should have a protective anodized finish. There should be an extruded silicone rubber section fitted into the top of the trucking to cater for up to 10mm of wall variation.

Installation

- The Panel should be hung onto the wall with a separate rail-bracket which allows simple horizontal and secured to the bracket and to the wall vertical alignment taking into account any wall high spots are unevenness.

Components

- The Panel system should be capable of medical gases terminal units. Electrical sockets from UK, US and European or other types of socket may e fitted. Provision for nurse call, data or monitoring sockets should be made at the point of manufacture. Panel should have the option of being supplied pre-piped, pre-wired and fully tested or in carcass form.

Maintenance

- Individual fascia plates should be removed by the use of a special tool to enable any maintenance to be carried out without disturbance to other services.

Each bed head panel of 6 ft length should be having:

- Provision for medical gases outlets (2 Oxygen, 2 Vacuum, and 1 medical Air).
- Provision for 6 numbers 5/15amp. For electrical sockets.
- Provision for one nurse call switch
- One equipment rail of suitable minimum 500 mm
- Inbuilt top & bottom lighting.

17) Medical Copper Piping:

<u>Medical Gas Pipes</u>

The piped distribution system shall use copper pipes manufactured from phosphorous de-oxidised non-arsenical copper to BS EN 1412:1996 grade CW024A (Cu-DHP), manufactured to

metric outside diameters and having mechanical properties in accordance with BS EN 13348:2001-R250(half hard) for sizes up to 54mm or BS EN 13348:2001-R290 for larger sizes. Pipes shall be degreased suitable for oxygen use and cleanliness is to be maintained by filling each pipe with dry, clean, oil and oxygen free nitrogen, fitting suitable end caps and protectively wrapping. All pipework materials shall be manufactured by BS EN ISO 9001:2001 registered companies.

Marking

For sizes up to 54 mm, copper pipes shall be permanently and durably marked at regular intervals along its length with the following information:

A) The harmonised standard number EN 13348;

B) BSI kitemark/ statement/ equivalent approval;

C) Normal dimensions, diameter x walll thickness;

D) Manufacturer's identification;

E) Date of production: year and month (1 to 12)

F) Confirmation of degreasing for oxygen;

Example: BS EN 13348 22x0.9 R250 WIELAND LAWTON KITEWORKED DEG/MEDICAL 05 01 Following installation, pipelines shall be clearly identified with 150mm wide adhesive labels. Labels shall be fitted near walls, risers, valves and junctions. Colour coding and labeling shall be in accordance with BS 1710;1984. Arrows to identify the direction of gas flow shall be fitted adjacent to each identification label.

Medical Gas Pipeline Fittings

Fittings shall be end feed type, manufactured from the same grade of copper as the pipes and be in accordance with the requirements of BS EN 1254-1:1998 Part 1. Fittings shall be degreased suitable for oxygen use and be supplied individually sealed in protective polythene bags.

Component Cleanliness

Degreasing of pipe shall be such that there is less than 20mg/m^2 (0.002mg/cm^2) of hydrocarbons on the degreased surface when tested by the method specified in EN 723. The degreasing of fittings shall be such that there is less than 100mg/ m^2 (0.01mg/ cm^2) of hydrocarbons on the degreased surface when tested by the aforementioned method. All pipeline components shall also be free of any visible liquid detergent washing or solvent degreasing. Other methods may be used

if they are proven and can be guaranteed to achieve acceptable results without degradation of the component of the environment.

Brazed Pipeline Joints

Pipelines shall be supported at the intervals specified in HTM 2022/02-01 using a suitable metallic, non-ferrous material or a ferrous material suitably treated to prevent corrosion and electrolytic action. Plastic supports shall only be used for support of drops to terminal units.

Maximum intervals between pipe supports as specified in HTM 2022/02-01:

Pipe outside diameter (mm)	HTM2022 Vertical Runs (m)	HTM 2022 Horizontal Runs (m)	HTM02 Horizontal and Vertical Runs (m)
12	1.2	1.0	1.5
15	1.8	1.2	1.5
22	2.4	1.8	2.0
28	2.4	1.8	2.0
35	3.0	2.4	2.5
42	3.0	2.4	2.5
54	3.0	2.7	2.5
76	3.6	3.0	3.0

Installation

Where pipeline pass through walls they shall be provided with copper sleeves and filled with suitable in tumescent fire stopping compound. Pipeline joints shall not be locate inside copper sleeves.

IN ADDITION TO THE ABOVE, FOLLOWING TURNKEY WORKS FOR INSTALLATION AND COMMISSIONING OF MEDICAL GAS MANIFOLD SYSTEM ARE 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/NDMC, 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”.

- **Electric distribution panel** for the above MGMS 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)

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

- Installation of MCB, ACB, ELCB & OCB of Havell/Siemens/L&T/Schneider etc for **Control Panel** for Medical Gas Pipeline 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 Pipeline System and other electrical instrument and accessories in the Medical Gas Pipeline System as per standard guidelines of BIS.

- Ventilation of Plant Room and Manifold Room of the MGMS and exhaustion of suctioned gases/air from the Vacuum unit.

- Arrangement for requisite **Fire Fighting** for the Plant Room and Manifold Room

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

APPROVED MAKES

1.	Air Blower	SWAM/ EVEREST/ KAY/Beta
2.	Cable	GLOSTER/UNIVERSAL/NATIONAL/ KALINGA
3.	Control Panel	L & T/ SIEMENS/ SCHNEIDER
4.	PVC Pipe Class III with Fitting	FINOLEX/ SUPREME/ PRINCE/ ORI-PLAST
5.	G.I. / M.S. Pipe Heavy Class	TATA/ JINDAL/SAIL /SURYA PRAKASH/HSL/ITC
6.	MCCB/Contactor/Relay	L&T/ABB/SIEMENS/SCHNEIDER
7.	Pressure Gauges	H.GURU /FIEBIG
8.	Stainless steel	TATA/SALEM/JINDAL/MUKUND/ BHAYANDER/ AMBICA
9.	Aluminium Sheet	BALCO/NALCO/HINDALCO
10.	Grilles/Diffusers	RAVISTAR/CARYAIRE/ MAPRO/DYNACRAFT
11.	Copper Pipe-	MAXFLOW/RAJCO/PRECISION

Note :

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

- **Manufacturer's Authorization in case the bidder is not the manufacturer.**

- **The contractor shall be responsible for the complete works including submission of working drawing.**

- **Bidder should provide complete Operation manual, Parts manual and Service manuals for all systems and subsystems.**

- **Final electrical safety test, system test and calibration should be done by authorized person with test instruments.**

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

- **Wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of HSCC.**

- **The contractor should provide test certificate for all materials and equipments used for MGMS**

- **Training of personnel of the Institute should be 30 days at least discretion conscientious relentless**

- **The contractor should prepare and submit to HSCC the layout plan for Gas pipeline system(Copper pipe line system with Valve Box and Alarm System for the hospital and the Electrical Wiring, EDP, Fire Fighting System, Ventilation for approval before beginning of supply and installation and <u>As-built</u> drawing after installation, testing and commissioning.**

- **Bidder should quote cost of <u>one year operation</u> during Defect Liabilty Period and <u>five year CMC</u> cost. The costs of operation and CMC shall be considered for ranking purpose. The bid shall be rejected if the costs for operation and CMC are not quoted.**

- **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".**