

OFFICE OF THE HOSPITAL DIRECTOR
AYUB TEACHING HOSPITAL ABBOTTABAD



TENDER DOCUMENTS

VOLUME-III

**TENDER DOCUMENT FOR MEDICAL GASSES SYSTEM AT AYUB
TEACHING HOSPITAL**

FOR FINANCIAL YEAR 2017

Design and Supervision Consultant



M/S _____

Due on: _____

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1(a) INVITATION FOR BIDS

Date: _____

ADP No: _____

Bid reference No: _____

1. The Hospital Director ATH invite sealed bids (the financial envelop should be separated with earnest money of 2% for each item),from eligible firms a foreign Bidders is entitled to bid only in joint venture with a Pakistani contractor having manufacturing facility in Pakistan.
2. Bidders may obtain further information from, inspect at and acquire the bidding documents from the office of Director ATH.
3. Bidding shall be conducted using National competitive procedures as specified in the KPPRA rules 2014 based on single stage two envelopes Procedure. Technical and Financial proposals should be sealed in two separate envelopes and be placed in third envelope. The name of the Bidder and Tender description shall be clearly marked on the envelope separately.
4. A complete set of Bidding Documents may be purchased by an interested Bidder on submission of writing application to the above office and upon payment of non-refundable fee of Rs.3000/-
5. All Bids (Technical must be accompanied by a Bid security in the amount of 2% of Bid Amount in the form of CDR from any schedule bank of Pakistan in favor of Hospital Director ATH at or before on dated 03-03-2017. Bids will be open at on the same day, in the presence of bidders representatives who choose to attend at same address.

Address:-

OFFICE OF THE HOSPITAL DIRECTOR
ATH

**Hospital DIRECTOR
Ayub teaching Hospital**

1(b) CHECK LIST

The provision of this checklist is essential prerequisite along with submission of tenders.

S/NO	DETAILS	YES/ NO	PAGE# ANNEX.
KNOCK OUT CLAUSES			
1	Original receipt for purchase of tender Original receipt for purchase of tender for each alternate		
2	The financial envelopes should be separated of each item, clearly marked company name and quoted serial item number and name.		
3	Copy of earnest money without amount in technical bid		
4	Acceptance of terms and condition, tender documents duly signed and stamped		
5	Non Compliance of Technical compliance sheet		
6	Sole agency certificates		
7	Proof of past import of quoted items from manufacturers (copy of bill of entry &etc)		
8	Original Literature/ Broacher of product showing complete contact details of the manufacturer		
9	Copy of previous installation reports in reputable Govt./ Private teaching hospitals		
10	Copy of GST Certificate		
11	Copy of NTN Certificate		
12	Copy of last three years paid income tax challan		
13	Copy of registration with chamber of commerce		
14	Bank certificate showing financial capability		
15	Bidders questioner Performa for bid evaluation		
16	Price should not be mentioned on technical bid		
17	Certificate/ documentary proof of the effect that the principal is the original manufacturer of the required goods (major components, mainframe, etc)		
18	Certificate regarding quality of production for conformity with international standards , International / National certification from regularity body / Professional body		

EVALUATION CRITERIA

The company documents must show documents proof of the following:

- (a) Financial capability to annually sustain a Half million level of work in Pakistan over 3 (three) years period.
- (b) The availability of the execution equipment required to carry out the works.
- (c) Capability to schedule the work, monitor progress against schedules and modify schedules on a current and updated basis utilizing computerized CPM or equivalent techniques.
- (d) Capability to obtain and transport to the site all of the necessary materials required for execution.
- (e) Capabilities to manage supervise and perform the work in a manner and quality commensurate with the highest level achievable in the industry.

FIRM EVALUATION CRITERION

EVALUATION CRITERION:

The following criterion will be followed for the evaluation of the contractors who participate in the tender process.

- Firms obtaining overall less than 70% marks and / or less than 50% marks in any section of the evaluation criteria shall not be approved.

Mandatory Requirement

S.No.	Parameters	Required	Obtained
1.1	Is your firm currently black-listed by any Government / Semi-Government organization?	NO	
2.1	Is your firm registered with Pakistan Engineering Council in Category C-4 for specialization ME-06 (Medical Equipment)? If yes, please provide details.	YES	
3.1	Has your firm Successfully commissioned Hospital Project in Pakistan of similar nature?	YES	

Category Based Requirement

TYPE	Sr.	DESCRIPTION	Marks	Minimum Required	Obtained
Status Of Firm	4.1	Type of Firm <ul style="list-style-type: none"> ➤ Private Ltd ➤ Partnership ➤ Proprietorship 	10 7 5		
	4.2	Average Annual Turnover in last 3 years <ul style="list-style-type: none"> ➤ More than or Equal to 150 Million ➤ More than or equal to 100 Million ➤ More than or equal to 50 Million ➤ Less than Rs. 50 Million <p style="text-align: center;">Please provide relevant</p>	10 7 5 0		

TYPE	Sr.	DESCRIPTION	Marks	Minimum Required	Obtained
		documents as evidence. Attach Audit report or bank statement			
	4.3	Maximum Amount of Medical Gasses Work Order Awarded in last 3 years <ul style="list-style-type: none"> ➤ Rs. 75 million & above ➤ Rs. 50 million & above ➤ Rs. 20 million & above ➤ Less than Rs. 20 million 	10 7 5 0		
		SUBTOTAL VOLUME / MAGNITUDE OF WORK	30		
Past Experience	5.1	Medical Equipment Work Experience <ul style="list-style-type: none"> ➤ Over 10 Years ➤ Between 8 to 10 Years ➤ Between 5 to 8 Years ➤ Less than 5 year 	10 7 5 0		
	5.2	Work Done of Similar nature in last 3 years for orders above Rs.20 million successfully completed <ul style="list-style-type: none"> ➤ If more than 08 works ➤ 05-8 works. ➤ 03 –05 works. ➤ Less than 3 	10 7.5 5 0		
	5.3	Projects of Medical Gasses system, similar nature and complexity Completed in last three	5		

TYPE	Sr.	DESCRIPTION	Marks	Minimum Required	Obtained
		years(ANNEXURE-A)			
	5.4	Projects of Medical Gasses system similar nature and complexity in-hand during last three years (ANNEXURE-B)	5		
	5.5	<p>Experience in Medical Equipment</p> <ul style="list-style-type: none"> ➤ Any Hospital Project in Pakistan In Medical system with the minimum Cost of 40 million(Successfully commissioned) 10 ➤ Any Hospital Project In Pakistan In Medical system with the minimum Cost of 30 million(Successfully commissioned) 7.5 ➤ Any Hospital Project In Pakistan In Medical system with the minimum Cost of 20 million(Successfully commissioned) 5 ➤ No Hospital project in Pakistan 0 			
		SUBTOTAL EXPERIENCE OF FIRM IN MEDICAL EQUIPMENT	40		
Human Resources	6.1	<p>Highest qualification of Engineers</p> <ul style="list-style-type: none"> <input type="checkbox"/> Masters Level <input type="checkbox"/> Bachelor Level <input type="checkbox"/> Less than Bachelor <p>(Please provide list of mechanical engineers on company letter head duly signed by company official)</p>	5 3 0		
	6.2	<p>Number of Engineers</p> <ul style="list-style-type: none"> <input type="checkbox"/> More than 15 <input type="checkbox"/> 10-15 <input type="checkbox"/> 7-10 <input type="checkbox"/> Less than 7 	5 3.5 2.5 0		
	6.3	<p>Average Medical Equipment Experience by Engineer</p> <ul style="list-style-type: none"> <input type="checkbox"/> More than 10 years 	5		

TYPE	Sr.	DESCRIPTION	Marks	Minimum Required	Obtained
		<input type="checkbox"/> 7-10 <input type="checkbox"/> 5-7 <input type="checkbox"/> Less than 5	3.5 2.5 0		
	6.4	Number of Technical staff (supervisors/D.A.E.) on payroll <input type="checkbox"/> 20 or more <input type="checkbox"/> 15-20 <input type="checkbox"/> 10-14 <input type="checkbox"/> Less than 10 <i>(Please provide list of Technicians on company letter head duly signed by company official)</i>	5 3.5 2.5 0		
	6.5	Average Medical Equipment Installation Experience by Technicians with D.A.E. Diploma <input type="checkbox"/> More than 25 years <input type="checkbox"/> 15-25 <input type="checkbox"/> 9-14 <input type="checkbox"/> Less than 9	5 3.5 2.5 0		
	6.6	Detail of Machinery & Equipment for execution <input type="checkbox"/> Proper Machinery owned by firm <input type="checkbox"/> Ranted machinery for execution <input type="checkbox"/> Machinery not available as per Requirement	5 2.5 0		
		SUBTOTAL WORKFORCE	30		
		TOTAL	100		

QUALIFICATION FORM-1

List of Previous Experience of Similar Nature of Works

NAME OF PROJECT & LOCATION	FULL NAME & ADDRESS OF CLIENT	TYPE OF CONTRACT PERIOD OF CONTRACT	CONTRACT VALUE (INDICATE CURRENCY IN PAK Rs. ONLY)	TYPE OF WORK	CARRIED OUT ALONG OR IN PARTNERSHIP (IF IN PARTNERSHIP STATE SHARE & NAME OF PARTNER)	START DATE	COMPLETION DATE

ANNEXURE-B

QUALIFICATION FORM-2

List all Projects of similar nature, which your firm has under way at this time

NAME OF PROJECT & LOCATION	FULL NAME & ADDRESS OF CLIENT	TYPE OF CONTRACT PERIOD OF CONTRACT	CONTRACT VALUE (INDICATE CURRENCY IN PAK Rs. ONLY)	TYPE OF WORK	CARRIED OUT ALONG OR IN PARTNERSHIP (IF IN PARTNERSHIP STATE SHARE & NAME OF PARTNER)	START DATE	COMPLETION DATE

QUALIFICATION FORM-3

LIST OF PLANT AND EQUIPMENT ITEMS OWNED BY YOUR COMPANY AND/OR EQUIPMENT TO BE LEASED OR PURCHASED TO BE USED BY YOUR COMPANY FOR THIS PROJECT IF AWARDED THIS CONTRACT

DESCRIPTION OF EQUIPMENT	EQUIPMENT OWNED AND YEARS OF SERVICES	EQUIPMENT TO BE PURCHASED OR LEASED	GIVE SPECIFICATION OF EQUIPMENT

Note:

From the above technical evaluation criteria the supplier/contractor scoring greater than 70 marks shall be technically selected/qualified and shall be further considered for financial bid opening. In case of JV leading party should fulfill all requirements.

1. Organization and Financial Data:

1. Type of Business Organization (Corporation, Joint Venture, Partnership etc.)
2. Date Business Founded.
3. Annual Volume (Turnover) last three years in Pakistani rupees (both parties).
4. Attach the latest audited Financial Statements of the last three years of your Company which should include the following documents. In the case of JV provide the documents for all the partners:
 1. Balance Sheet.
 2. Income Statement.

2. Performance Record:

1. Please provide a brief resume of works completed by your firm in the last five years including all jobs involving similar nature of works
2. List of projects currently in progress of similar nature of works.

3. Organization:

1. Provide organization chart of your firm. Indicate lines of communication and reporting responsibility.
2. Detail of key technical staff with their qualification and experience including of those who would be deputed for the proposed project.
3. Details of execution equipment, plants, machinery and tools owned by the organization and to be utilized on the project
4. Provide the list of subcontractors to which you intend to assign work. Indicate their main area of experience, the approximate amount of work to be assigned, their brief experience record and their organization and management staff.

FINANCIAL BID EVALUATION CRITERIA:

The CRITERIA for the evaluation of the financial bids shall be as follows:

The Consultant will examine the Bids to determine whether;

1. The Bid is complete and does not deviate from the scope,
2. Any computational errors have been made,
3. The required sureties have been furnished,
4. The documents have been properly signed,
5. The Bid is valid till required period,
6. The Bid prices are firm during currency of contract.
7. completion period offered is within specified limits,

The bid shall be declared substantially responsive if it satisfies all these conditions.

The bid will not be considered, if;

8. it is not accompanied with Bid Security,
9. it is unsigned,
10. its validity is less than specified,
11. it is submitted for incomplete scope of work,
12. it indicates completion period later than specified,
13. it indicates that prices quoted are not firm during currency of the contract,
14. it indicates that Goods and material to be supplied do not meet eligibility requirements,
15. it indicates that Bid prices do not include the amount of all taxes,
16. if Bidder refuses to accept arithmetic corrections,
17. If it is materially and substantially different from the Conditions/Specifications of the Bidding Documents,
18. Any conditional bid.

Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between the words and figures, the amount in words shall prevail. If there is a discrepancy between the total Bid Price entered in the Form of Bid and the total shown in Schedule of Prices Summary, the amount stated in the Form of Bid will be corrected by the Employer/Engineer in accordance with the Corrected Schedule of Prices.

If the Bidder does not accept the corrected amount, his Bid will be rejected and his Bid Security be forfeited.

Prior to the detailed evaluation, the Consultant will determine the substantial responsiveness of each Bid to the Bidding Documents. For purpose of these Clauses, a substantially responsive Bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations.

A material deviation or reservation is one

19. which affect in any substantial way the scope, quality or performance of the Works;
20. which limits in any substantial way, inconsistent with the Bidding Documents, the Employer's rights or the Bidder's obligations under the Contract; or
21. Whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids

The Engineer's determination of Bid responsiveness will be based on the contents of the Bid itself without recourse to extrinsic evidence.

A Bid determined as substantially non-responsive will be rejected and will not subsequently be made responsive by the Bidder by correction of the non-conformity.

Any minor informality or non-conformity in a Bid which does not constitute a material/substance of bid document deviation may be waived by Employer, provided such waiver does not prejudice to affect the relative ranking of any Bid.

Detailed Evaluation of Bid

The Employer/Engineer will evaluate and compare only the bids determined to be substantially responsive as per requirements given above:

Evaluation and Comparison of Bids procedure

22. Bids will be evaluated for each item for complete scope of work

In evaluating the bids, the Employer will determine for each bid in addition to the Bid Price, the following factors (adjustments) in the manner and to the extent indicated below to determine the Evaluated Bid Price.

23. Price Adjustment for Completeness in Scope of Work

In case of omission in the scope of work of a quoted item price, NO adjustment for the omitted item(s) shall be applied provided that the Bidder has mentioned in his bid that the same is covered in any other item(s).

In case of omission in the scope of work of a quoted item price, adjustment for the omitted item(s) shall be applied as the highest price quoted for that item by the other responsive bidders, provided that the Bidder has NOT mentioned in his bid that the same is covered in any other item(s).

24. Price adjustment for completion Schedule

Bids indicating completion in advance of the dates stated in Preamble to Conditions of Contract, no credit will be given in this evaluation.

The bidder whose adjusted price is the lowest after applying all the above conditions shall be declared as the lowest responsive bidder.

Submission of documents:**Original Brochure**

Tender Item No	Name of Equipment	Manufacturer / Origin

Name: _____**Designation:** _____**Signature:** _____**Name of Firm:** _____**Stamp of Firm:** _____

TERMS AND CONDITION

- 1 Bid should remain valid for 90 days from the date of financial opening.
- 2 Price should be quoted on FOR basis in Figure and words failing and words failing which the offer will be ignored.
- 3 The supplier will be bound to train nominated technical personnel to operate / repair and maintain the supplied equipment.
- 4 Bidders should confirm the presence of Manufacturers trained service/installation Engineers/Technicians and provide the derail of their working experience, Manufacture training Certificate, list of tools and test equipment, approximate area of workshop in the premises of their office and address along with the bid.
- 5 List of hospitals, name of department, contact numbers of the end users, in which the quoted equipment are working must be attached. Copy of previous installation report in a reputed Govt./Private/Teaching Hospitals/ repair certificate if any, of the similar quotes items from the end user should be attached along with the bid.
- 6 In this tender envelops procedure as per KPPRA 2014 rules will be followed i.e., Technical and Financial proposal separately, i.e. single stage two envelops system. The envelope must contain tender enquiry no. on the top and TECHNICAL/FINCIAL PROPOSAL clearly in order to avoid any confusion. The tenders shall be submitted with all documents, drawing literature & catalogue (in equipment) | Technical proposal, with sealing wax. The name of manufacturer or supplier should be affixed on the face of envelop at the left side, moreover, financial envelops should contain financial bid each item separately.
- 7 Tender must be filled in with blue or black ink in the column provided and on separate letter head duly signed.
- 8 The tenders must not be hand written and free from erasing, cutting and overwriting.
- 9 The rates of each item should be written in figures as well as in words. In case of discrepancy the price in words will be taken as authenticate and final.
- 10 Condition tenders will be ignored and will not be considered / entertained / accepted.

- 11 Tender shall be accompanied by Earnest Money @2% of value of rates quoted by them in from of call deposit (CDR) in the name of Hospital Director Ayub Teaching Hospital Abbottabad.
- 12 Copy of earnest money (without amount) must be attached along with the technical bid the original along with financial bid case of disclosure of price of amount of Earnest Money in the technical bid, the bid will be rejected.
- 13 Original purchase receipt must be enclosed with their technical offer.
- 14 The tender rate (FOR) price should be inclusive off all taxes. Income and sales tax etc payable to Federal and Provincial Government or local bodies and no claims on these accounts shall be entertained.
- 15 The bidder shall furnish General Sales Tax (GST) Registration Certificate of the firm failing which the offer will be ignored; In case the item is exempted from GST either documentary evidence or certificate from competent authority shall be attached with the offer.
- 16 The bidder shall furnish copy of valid Professional Tax Certificate, Income Tax Certificate: Last three years paid income tax Challan, proof of registration with Chamber of Commerce and active on ATL list.
- 17 Bidder should submit a fresh certificate showing strong financial capability of firm.
- 18 The original printed catalogue / technical brochure showing detail technical specification, clear photo/picture of the quoted item, Manufactures address, Phone number, e-mail address and website must accompany with offer.
- 19 The equipment to be imported comply / certificate of international standard, international / national certification from regularity body / professional body and should be attached along with the offer.
- 20 storage is required immediately. The tender, may however give their short guaranteed delivery period by which the supply will be completed positively.
- 21 If the Contractor fails to attain completion of the supply or installation within the time for completion, he shall pay to the purchaser liquidated damages at the rate of 2% per month (0.5% per week) of the Contract Price, or the relevant part thereof. The aggregate amount of such liquidated damages shall in on event exceed 10% of the bid

amount. Once the “maximum Limit” is reached, the purchaser may consider termination of the Contract.

- 22 Tenderers are required to furnish a details technical quotation on their letter head and specify the standard and optional items / accessories as required in the tender specification. Bidder should clearly mention make, model and country of origin of the quoted items.
- 23 Choice to select / ignore any alternate offers shall rest the purchaser
- 24 Tender shall purchase separate tender documents and furnish purchase receipt for each Alternate offer in case they want to submit alternate offers without separate purchase receipt(Original) are supposed to be rejected.
- 25 No manufacturer shall authorize their distributer. Agent/ any firm or person to quote the same Item which manufacturer quoted it-self in any tender. Failing that offer of both the Manufacturer as well as other bidder shall be ignored.
- 26 The bidder shall comprise a single package containing two separate envelops. Each Envelop shall contain separately the financial proposal and the technical proposal.
- 27 The envelops shall be marked as “**FINALCIALPROPOSAL**” and “**TECHNICAL PROPOSAL**” in bold and legible lattes to avoid confusion.
- 28 Initially only envelop marked as “**TECHNICAL PROPOSAL**” will be opened & envelop marked as “**FINALCIALPROPOSAL**” shall be retained in the custody of the procuring agency without being opened.

PURCHASER'S RIGHT TO VARY QUANTITIES AT TIME OF A WARD.

The purchaser reserves the right to increase. Decrease or delete the quantities of good etc at the time of award of contract and also reserve the right to enhance the quality goods and services originally specified in the schedule of requirements without any change in unit price of other terms and conditions of good at any time during contact period.

NOTIFICATION OF AWARD / ADVANCE CONTRACT:

- 1 Prior to the expiration of the period of the bid validity, the purchaser will notify the successful bidder in writing, delivery by hand or by register by cable to be confirmed that their bid has been accepted.
- 2 The notification of award will constitute the formation of the contract.

AWARD OF CONTRACT AND CONTRACT AGREEMENT.

Subject to the fulfillment of all codal formalities, the purchaser will award the contract to the successful bidder whose bid has been determinate to be qualified to perform the contract satisfactory.

UNDERTAKING:

1. That I/We agree whether our tender accepted for total partial or enhanced quantity for all or any single item. I/We also agreed to supply and accept the said item at the rates for the supply of contracted quantity within the stipulated period shown in the contract.

2. I/we understand and confirm the refund of cost different if the same good is/was supplied at lower rates to any other government/ Semi Government Institution in the Province in same fiscal year.

3. I/We undertake that: I any of the information submitted in accordance to this tender enquiry found incorrect our contract may be cancelled at any stage on our cost and risk.

CERTIFICATE:

We guarantee to supply the sores exactly in accordance with the requirement specified in the invitation to this tender.

Signature of Tenderer: _____

Name & Designation: _____

Address: _____

BID FORM AND PRICE SCHEDULE

Dated: _____

Tender No: _____

To:

[Name of address of procuring agency]

Gentlemen and/or Ladies;

Having examined the Bidding Documents including addenda no: [insert numbers], the receipt of which is hereby duly acknowledge. We, the under signed, offer the supply and deliver [description of goods and service] in conformity with the said Bidding Documents for the sum of [total Bid Amount in words and figures], or such other sums as may be ascertained in accordance with the schedule of Price attached herewith and made part of this bid.

We undertake, if our bid is accepted, to deliver the goods in accordance with deliver schedule specified in the schedule requirements.

If our bid is accepted, we will obtain a guarantee of a bank in the sum of equipment to _____percent of the Contract Price for the due performance of the Contract, in the form prescribed by the Procuring Agency.

We agree to abide by for a period of [number] days from the date fixed for bid opening as per bid term and condition, and it shall remain binging upon us and may be accepted at any time before the expiration that period.

Until a formal contact is prepared and executed, this bid, together with your written acceptance thereof and your notification of award shall constitute binding Contract between us.

Commissions of gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded to contract, are listed below;

Name of address of agent gratuity	Amount and Currency	Purpose of Commission or gratuity
_____	_____	_____
_____	_____	_____

We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this _____ day of, _____ 2017

Signature: _____

In the capacity of: _____

Duly authorized to sign bid for and on behalf of: _____

BID SECURITY FORM:

Whereas [name of Bidder] (hereinafter called the Bidder) has submitted its bid dated [date of submission of bid] for the supply of [name / or description of goods] (hereinafter called the bid.

KNOW ALL PEOPLE by these presents that we [name of bank] of [name of country], having our registered office at [address of bank] (hereinafter called the bank) are bound up tot [name of procuring agency] (hereinafter called “the Procuring Agency”) in the sum of for which payment well and truly to be made to said procuring agency, the bank binds itself, its successors and assigns by these presents. Sealed with common seal of the said bank this _____ day of _____, 20____.

The conditions of this obligation are:

1. If the bidder withdraws its bid during the period of bid validity specified by the bidder on the bid for: Or
2. If the bidder, having been notified of the acceptance of its bid by the procuring agency during the period of bid validity:
3. Fails or refuses to excuse the contract form, if required; or
4. Fails or refuses to furnish the performance security, in the accordance with instruction to bidders.

We undertake to pay to the procuring agency up to the above amount upon receipt of its first written demand, without the procuring agency having to substantiate its demand, provided that in its demand the procuring agency will note that the amount claimed by it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including 28 (twenty eight) days after the period of bid validity, and any demand in respect thereof should reach the bank later than the above date.

Signature of Bank

CONTRACT AGREEMENT:

THIS AGREEMENT made at _____ day of 20____ between [name of procuring agency] of [country of procuring agency] (herein after referred to as the “Procuring Agency”) of the on Part; and [name of supplier] of [city and country of supplier] (herein after called the “Supplier”) of the other Part.

WHERE AS the Procuring Agency invite bids for certain goods and ancillary services, via [brief description of goods and service] and has accepted the bid by the Supplier for the supply of those goods and service in the sum of [contract price in words and figures] (herein after called the “the contract price”).

Now this contract Witness As Follows:

1. In this agreement words and expressions shall have the same meanings as are respectively assigned to them in the General Conditions of this Contract herein after referred to:
2. The following documents shall be deemed to form and be read and construed as part of this agreement, via:-
 - a. The Bid form and price Schedule submitted by the Bidder;
 - b. The schedule of requirements;
 - c. The technical specifications;
 - d. The General conditions of Contract;
 - e. The Special conditions of Contract;
 - f. The Procuring Agency’s Notifications of Award;
3. In consideration of the payments to be made by the Procuring Agency to the Suppliers hereinafter mentioned, the supplier hereby covenants with Procuring Agency to provide Goods and Services and to remedy defects therein conformity in all respects the provisions of this Contract.
4. The Procuring Agency hereby covenants to pay the Supplier in consideration of the Goods and Services and remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of this contract at the time manner prescribed by this Contract.

IN WITNESS where of the parties here to have caused this agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, Sealed, Delivered by _____ the _____

(For the Procuring Agency)

Signed, Sealed, Delivered by _____ the _____

(For the Supplier).

PERFORMANCE SECURITY FORM:-

To,

[Name of the Procuring Agency]

[Whereas name of Supplier] (Herein after called "the Supplier") has undertaken in pursuance of Contract No. [Number] dated [date] to supply [description of goods] (herein after called "the contract").

And whereas it has been stipulated by you in the said Contract that the supplier shall furnish you with a Bank Guarantee by a reputable bank for the sum specified therein as security for compliance with the Suppliers Performance obligations in accordance with the Contract.

And whereas we have agreed to give the supplier a Guarantee.

Therefore we hereby affirm that we are Guarantors and responsible to you on behalf of the supplier up to a total [amount of the Guarantee in words and figures] and we undertake to pay upon your first written demand declaring the Supplier to be in default under the Contract and without cavil or argument, any sum or sums within limits of [Amount of Guarantee] as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the _____ day of _____ 20_____.

Signature and Seal of the Guarantors / Bank: _____

Name of Bank or Financial Institution: _____

Address: _____

Date: _____



MEDICAL GASSES WORKS AT

Ayub Teaching Hospital

TENDER DOCUMENTS

VOLUME-II

GENERAL CONDITIONS OF CONTRACT

Design and Supervision Consultant:

PEPAC

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1 Scope of Work

- 1.1 The Selected Bidder will be responsible for the supply, installation, testing and Commissioning of Medical Gasses system along with auxiliaries and components at Ayub Teaching Hospital, Abbotabad.
- 1.2 Selected Bidder must ensure that the supplied equipment is fully operational, new and Perform properly and meet RFP's Technical requirement.
- 1.3 At the time of installation and commissioning, Selected Bidder must provide comprehensive documentation of system deployed including diagrams, labeling, schematics, configuration and manuals etc.
- 1.4 Selected bidder shall be responsible for Training for knowledge transfer to engineers/operators and support personnel will also be the responsibility of the Bidder.
- 1.5 Selected bidder shall have to complete the project within required time period after signing the contract. The time period for completion of this project is 4 months.

2 Bids Submission Requirements

The objective of bid submission requirement is to provide bidders with the information to submit their bid in response of this RFP according to the specifications defined in this RFP and in order/sequence as set forth in this document. Bidders must follow below requirements while preparing their proposals/bids proposal and submission.

The bidder is required to submit TWO proposals:

1. Technical Proposal,
2. Financial Proposal

For this tender, there will 'Single stage - Two Envelope Procedure' for bidding.

- 2.1 The bidder is required to submit Bid in Two Envelopes. Envelope should also be labeled with the name, address and contact number of the bidding company.
- 2.2 Bidders shall submit the Bid along with brochures/data sheets explaining the items quoted.
- 2.3 The bidder must provide Project Execution Plan, Design Proposal with layouts, diagrams, etc. along with Technical Proposal.
- 2.4 Bidders are required to fill and sign all pages of "Bill of Costs" in writing while following the format given, and submit it as Financial Proposal. Financial Proposals not following the given format may lead to the rejection of bid.
- 2.5 Bidders are required to submit their financial proposals in PAK Rupees (Rs.)
- 2.6 The Bid Security equal to 2% of the Total Bid Value, in the form of Deposit at Call (CDR) by a Scheduled Bank in Pakistan in favor of Hospital Director Ayub Teaching Hospital, Abbottabad must accompany the bid as a part of proposal. The bid shall not be considered without Bid Security.
- 2.7 The Bidder shall clearly mention his delivery schedule and completion period of project in his proposal.
- 2.8 The bidder must submit letter verifying that the quoted solution complies with provided sizing information and will meet the required performance parameter.

3 Selection Procedures

- 3.1 A two step process will be used for the selection of a bidder for the award of this Tender
- 3.2 Ayub Teaching Hospital intent in issuing this Tender Document is to award a contract to the lowest and best responsive bidder who meets specifications as laid out in technical specification and who fulfill all Mandatory Requirements mentioned in General Terms and Conditions. If any of the requirements or equipment specifications is not met by the bidder, the bid will be considered as non-responsive, and the bid of the next bidder will be considered.
- 3.3 After the approval of contract award, a contract agreement on the stamp paper worth Rs. 100/- shall be executed by the Ayub Teaching Hospital with selected bidder within 15 days from the date of issuance of Letter of Intent on standard terms and conditions.

3.4 For ordering purpose the price evaluation will be done against items.

3.5 Mode of Payment.

For Imported Equipment:

a) 50% (Fifty percent) of the quoted rates of imported items in schedule of prices shall be paid on delivery of equipment /materials at site and issuance of inspection certificates and approval by the Engineer and Consultant.

b) 20% (twenty percent) of the quoted rates of imported equipment / materials in schedule of prices shall be paid on completion of installation of equipment to the satisfaction of the Engineer and Consultant.

c) 20% (twenty percent) of the quoted rates of imported equipment / materials in schedule of prices shall be paid on completion of testing and commissioning of the equipment and system and issuance of taking over certificate by the Engineer and Consultant.

d) The balance 10% (ten percent) of the BOQ rates shall be adjusted towards Retention Money that will be paid after the expiry of warranty period and certification by the engineer and consultant.

LOCAL ITEMS:

a) 50% (fifty percent) of the quoted rates of local items in schedule of prices shall be paid on delivery of equipment /materials at site and issuance of inspection certificates and approval by the Engineer and Consultant.

c) 20% (twenty percent) of the quoted rates of local equipment / materials in schedule of prices shall be paid on completion of installation to the satisfaction of the Engineer and Consultant.

d) 20% (twenty percent) of the quoted rates of local equipment / materials in schedule of prices shall be paid on completion of testing and commissioning of the equipment and system and issuance of taking over certificate by the Engineer and Consultant.

e) The balance 10% (ten percent) of the BOQ rates shall be adjusted towards Retention Money that will be paid after the expiry of warranty period and certification by the engineer and consultant.

3.6) The successful bidder has to furnish the Performance Guarantee in the shape of Insurance Guarantee from AA rating insurance company equivalent to 10 % of the total contract. The said Guarantee will be released after the successful testing and commissioning of Medical Gasses system at Ayub Teaching Hospital.

4 Liquidated Damages

In case of delay, the Hospital Director, ATH, Abbottabad reserves the right to impose a penalty not exceeding 10% of the total amount of the contract at the rate of 0.5% of the total contract value for each week of delay.

5 Project Timeline:

4 months from start of project.

6 General Terms and Conditions

Following general terms & conditions apply to this RFP

5.1 Validity period of the bids regarding the award of contract shall be 3 months (90 days).

5.2 The decisions of Hospital Director, ATH Abbottabad will be binding on all concerned and will in no case be challengeable at any forum or any court of law.

5.3 Bids are liable to be rejected if; they are not conforming the terms, conditions and specifications stipulated in this RFP.

5.4 During the examination, evaluation and comparison of the bids, the Hospital Director, ATH Abbottabad at its sole discretion may ask the bidder for clarifications of its bid.

The request for clarification and the response both shall be in writing/email.

5.5 However, no change in the price or substance of the bid shall be sought, offered or permitted after bid submission.

5.6 Total Bid Value (Cost of equipment, Cost of Installation & Commissioning etc as per BOQ) shall account for financial evaluation and so shall be included in Total Bid Value.

5.7 The amount submitted as Earnest Money (2%) shall be refunded to the Unsuccessful bidders after the decision of "Tender Committee" for the award of said tender.

5.8 If there is a discrepancy between unit price and total price in the submitted bid Which is obtained by multiplying the unit price and quantity, the unit price shall prevail and total price shall be corrected. If there is a discrepancy between the words and figures, the amount in words shall prevail. If there is a mistake in

Addition/ totaling, that shall be corrected. If the bidder does not accept the corrected amount of bid, his bid shall be rejected and his bid security forfeited.

- 5.9 Incomplete and conditional BIDs will not be entertained.
- 5.10 In case of any dispute between the two parties of any matter arising out of after Signing the contract agreement, the case shall be referred to Hospital Director, ATH Abbottabad whose decision shall be final and binding on both parties.
- 5.11 Bids submitted via email or fax will not be entertained.
- 5.12 Bidders indemnify ATH Abbottabad against all third party claims of infringement of patent trade mark, industrial design rights arising from use of the goods of any part thereof in Pakistan.
- 5.13 ATH Abbottabad reserves the right to accept/reject wholly or partially any tender at any stage of the tender process.

Technical Specifications

MEDICAL AIR, GAS, AND VACUUM SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Medical oxygen gas system.
- B. Medical compressed air system.
- C. Medical vacuum system.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Execution requirements for Owner supplied oxygen tank.
- B. Section 31 2316 - Excavation.
- C. Section 31 2323 - Fill.
- D. Section 07 8400 - Firestopping.
- E. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- F. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- G. Section 22 0719 - Plumbing Piping Insulation.
- H. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2100 - Allowances for cash allowances affecting this section.
- B. Allowance includes purchase and delivery of bottled gases. Installation is not included in the allowance but is specified in this section and is part of the Contract Sum/Price.
- C. Allowance includes cost of testing and certifying systems in accordance with cross connection tests.

1.04 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012.
- C. ASME B40.100 - Pressure Gauges and Gauge Attachments; The American Society of Mechanical Engineers; 2005.
- D. ASME (BPV) - Boiler and Pressure Vessel Code; The American Society of Mechanical Engineers; 2010.
- E. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2010.
- F. ASTM A403/A403M - Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings; 2012.
- G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

- H. ASTM B32 - Standard Specification for Solder Metal; 2008.
- I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
- J. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2005 (Reapproved 2011).
- K. ASTM B819 - Standard Specification for Seamless Copper Tube for Medical Gas Systems; 2000 (Reapproved 2011).
- L. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011 and errata.
- M. CGA G-7 - Compressed Air for Human Respiration; Compressed Gas Association; 2008.
- N. CGA V-5 - Diameter-Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications); Compressed Gas Association; 2008.
- O. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- P. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2008 (with 2012 Errata).
- Q. MSS SP-88 - Diaphragm Type Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2010.
- R. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2010.
- S. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- T. NFPA 50 - Standard for Bulk Oxygen Systems at Consumer Sites; National Fire Protection Association; 2001.
- U. NFPA 55 - Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks; National Fire Protection Association; 2013.
- V. NFPA 99 - Health Care Facilities Code; National Fire Protection Association; 2012.
- W. HTM - 2022, Health Technical Memorandum 2022.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers literature and illustrations for all components indicating size, dimensions and configuration.
- C. Shop Drawings: Indicate general assembly of components, mounting and installation details, and general layout of control and alarm panels. Submit detailed medical wall assembly drawings.
- D. Samples: Submit Three of each outlet and each valve.

- E. Independent Testing Agency Reports: Indicate systems are complete, zone valves installed, alarm systems functional, and pressure and cross connections tests performed. Document tests.
- F. Certificates: Certify that Products meet or exceed specified requirements.
- G. Manufacturer's Instructions: Indicate installation requirements for equipment and systems.
- H. Manufacturer's Field Reports: Indicate systems are complete, zone valves installed, and alarm systems functional.
- I. Project Record Documents: Record actual locations of piping, valving, and outlets.
- J. Operation Data: Include installation instructions, assembly views, lubrication instructions, and assembly views.
- K. Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone.
- L. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Valves: One of each type and size.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 99 and HTM - 2022.
- B. Acceptable Installers:
 - 1. Must be comply with HTM - 2022.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.
- E. Testing Laboratory: Company specializing in performing testing of the type specified in this section, with minimum five years of documented experience.
- F. Conform to applicable code for medical gas systems.
- G. Provide certificate of compliance from authority having jurisdiction, indicating approval of systems.
- H. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 MOCK-UP

- A. Provide mock-up of outlets in typical patient head wall unit.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept material on site in factory containers and packing. Inspect for damage.

- B. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for equipments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- a) Of international standard

2.02 PIPE AND FITTINGS

- A. Factory Preparation: Wash inside of copper pipe and copper fitting with hot solution of sodium carbonate or trisodium phosphate mixed 1 kg to 25 L of water; rinse with water, and blow dry with oil-free dry nitrogen or compressed air.
- B. Oxygen, Compressed Air, Nitrous Oxide, Nitrogen Systems, Aboveground:
 - 1. Copper Tube: ASTM B819, Type K, H58 (drawn general purpose) temper.
 - 2. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper.
 - 3. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.
- C. Oxygen, Compressed Air, Nitrous Oxide, Nitrogen Systems, Buried:
 - 1. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), annealed.
 - 2. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper.
 - 3. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.
- D. Vacuum and Anesthesia Gas Evacuation Systems, Aboveground:
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper.
 - 2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze or ASTM B32, solder, Grade Sn95.

2.03 VALVES

- A. Factory Preparation for Oxygen Service: Disassemble, clean, degrease, seal, and pack for shipping.
- B. Ball Valves:
 - 1. Requirements: Comply with MSS SP-110; bronze body, three piece, double-seal ball valves with replaceable neoprene or teflon seat and stem seals, for minimum 4140 kPa cold working pressure, flange or union mounting, labeled for intended service.
- C. Diaphragm Valves (Oxygen, Nitrous Oxide and Nitrogen):
 - 1. MSS SP-88, brass-bodied, packless, diaphragm type with regrinding or renewable seats and disks, for minimum 2070 kPa working pressure.
- D. Pressure Regulation Valves (Medical Air):
- E. Gate Valves (Vacuum, Medical Air, and Anesthesia Gas Evacuation System):
 - 1. MSS SP-80; Class 150 bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.
- F. Ball Valves (Oral Evacuation Systems Only):

1. PVC body, double-seal ball valves with replaceable neoprene or teflon seat and stem seals, for minimum 690 kPa working pressure, designed especially for vacuum service.

2.04 PIPING ACCESSORIES

- A. Hangers and Supports: MSS SP-58 with types as required.
- B. Pressure Gages:
 1. ASME B40.100, white dials and black lettering with restrictor.
 2. Oxygen and nitrous oxide systems: Manufactured and labeled expressly for intended service; UL labeled.
- C. Vacuum Bottle Brackets: Stainless steel, chrome-plated metal, or aluminum with finish matching adjacent outlet.
- D. Flexible Connectors: Corrugated flexible, single ply, seamless or seam-welded tubing of stainless steel or bronze or reinforced teflon bellows or hose.
- E. Valve Cabinets:
 1. Extruded aluminum, flush-mounted and rigidly assembled to accommodate valves and fittings, punched or drilled sides to receive tubing, anchors to secure to wall construction.
 2. Cover Plates: Extruded aluminum, with replaceable plastic windows with pull ring to remove window.
 3. Cabinet Labels: labeled and color coded for intended service and area served.
 4. Valves: Pre-assemble and mount chrome plated valves and tubing extensions.
 5. Gages: Provide where indicated and in operating rooms areas downstream of isolating valves.
- F. Piping Identification: Pressure sensitive adhesive tape and decals, color and labeling to conform with Section 22 0553.

2.05 OUTLETS

- A. Outlet Units:
 1. Manufacturers: of international standard
 2. CGA V-5, Diameter-Index Safety System (DISS) non-interchangeable connectors, automatic valves, secondary check valves (except vacuum and evacuation outlets), and capped 8 mm tubing stubs for supply connections, color coded and labeled for intended service.
- B. Faceplates:
 1. Flush Outlets: Mount in galvanized steel boxes with stainless steel faceplate with Lexan cover, color coded with embossed labeling.
 2. Surface Outlets: Surface mount with color coded plastic cover and stainless steel faceplate with Lexan cover, color coded with embossed labeling.

2.07 MEDICAL COMPRESSED AIR SYSTEM

A. Manufacturers:

1. Of international Standards

B. Multiplex Air Compressor System:

1. To deliver CGA G-7 compressed air.
2. Scroll Oil Free Liquid Ring Compressors: Equipped with check valve, inlet and outlet flexible connector, isolation valve, safety relief valve, air by-pass solenoid valve, water air separator, float trap, strainer, compound gage, solenoid valve, bypass solenoid valve and metering valve for service liquid, inlet mufflers, motor coupling with guard.
3. The system will be rated at 3.8 bar source compressed air and a minimum of 3.4 bar at most remote outlet. Refer to mechanical schedule for nos. of pump.
4. Dual Desiccant Air Dryers: Each system is provided with a redundant set of desiccant dryers, filters, regulators, and safety relief valves. Dew point and carbon monoxide monitors with alarms are provided to continuously monitor the air quality. Each dryer contains two vessels filled with moisture adsorbent material. The dryer uses a fully automatic pressure swing adsorption cycle in which one tower is online in a drying phase while the other is offline, either regenerating or waiting for its next drying phase. The towers alternate between phases based on either time or dew point status, depending on the mode of operation. In fixed cycle mode, the total cycle time is 4 minutes, or 2 minutes per dryer. In variable cycle mode, the total cycle time can be increased up to 60 minutes. The self-cleaning ceramic switching valves form an almost indestructible seal.
5. Air Receiver: The system includes an ASME stamped receiver rated for a minimum of 150 PSIG MWP. The tank is equipped with a pressure gauge, an ASME relief valve, block and by-pass valves, and an automatic electronic tank drain with manual override. The receiver is internally lined, in-house, with an FDA approved material for corrosion resistance.
6. Control Panel: Each control panel is fully compliant with the latest edition of NFPA99 and is UL508A listed and labeled. The panel is provided in a NEMA 12 enclosure with a main power on light, timed automatic lead/lag pump alternation, reserve pump in use alarm with visual and audible indicators, and redundant control circuit transformers. Each pump is provided with an externally operable motor circuit breaker, Hand/Off/Auto selector switch, minimum run timer (to prevent short cycling of the pump), run hour meter, and run light. Dry contacts are provided on a labeled terminal strip for remote alarm monitoring. Horn silence and lamp test pushbuttons are standard. The lag compressor(s) will start automatically if the lead compressor fails to operate.

- ### C. Air Line Filter Regulator: Regulating assembly with line pressure adjusting knob, 50 mm diameter line pressure gage, 40 mm pipe size connections, clear polycarbonate collection bowl with 5 micron filter unit and automatic drain.

- D. The makeup air for the medical air compressors at every location shall be pipes from the nearest air handling unit downstream of the final filter to each compressor inlet.

2.08 MEDICAL VACUUM SYSTEM

A. Manufacturers:

- 1. of international standards

B. Multiplex Vacuum Pump:

- 1. Rotary Vane type Pumps: Tank mounted, each equipped with check valve, inlet flexible connector, water separator, strainer, compound gage, solenoid valve and metering valve for service liquid, exhaust muffler, motor coupling with guard.
- 2. The system will be rated at 19" Hg source vacuum and minimum of 15" Hg at most remote inlet.
- 3. The discharge vent for the vacuum pumps at every location shall be piped to the nearest relief air plenum and separated by 3m from any duct opening.
- 4. Vacuum pumps shall be air-cooled, oil lubricated rotary vane type, Composite carbon fibre rotor blades shall be fitted to minimise the cost of maintenance. Rotors shall be driven by directly coupled TEFV electric motors. Pump inlets shall include a wire mesh filter and integral non-return valve to prevent oil suck 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.

- C. 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). Bacteria Filter elements shall have penetration levels not exceeding 0.005% when tested by the sodium flame method in accordance with BS 3928:1969 and utilising 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 sterilisation and be connected via a manual isolating valve.

- D. 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 high-definition colour 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 maximise pump life and ensure even wear.

- E. Vacuum Receiver: Vacuum receiver(s) 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 galvanised inside and out.
- C. Vacuum / Flow Regulating Valve: A vacuum/flow regulating valve shall be provided, comprised of a spring-loaded plate valve and inlet silencer. The plate shall control air ingress into the pipeline system, thereby controlling the vacuum level within. The number and installed position of the regulating valves fitted to the system shall be determined by the pipeline designer. The vacuum/flow regulating valve shall ensure a maximum vacuum of 200mb below atmospheric pressure is not exceeded.
- D. Control System: Each motor control panel shall incorporate an emergency panel isolation switch facility, which controls all electrical power to the exhaustor unit, remote start switch panels and system indication lights. All control and status indication circuitry shall be limited to 24V a.c. A green 'POWER ON' indicator shall be fitted to the starter/isolator panel, and shall illuminate whenever power is available to the 24V control and indication circuit. A 'HAND/OFF/AUTO' switch shall be provided to control operation of the pump, running the pump continuously when selected to 'HAND'. When selected to 'AUTO', control of the pump shall be passed to the remote start switch panels. Operation of any of the remote start switches shall activate the pump. The pump shall continue to run until all remote switches are selected 'OFF'. The starter/isolator panel shall incorporate a thermal protection overload device. The thermal protection overload device shall also monitor the electrical power supply and phase input. In the event of a fault, the overload device shall break the circuit to the pump, preventing operation until the system is manually re-set. Operation of the overload device shall also break the circuit to the remote start switch panels, extinguishing the green running indicator. This line pressure switch monitors vacuum levels and provides an additional control of the remote start switch and starter/isolator panel green 'RUNNING' indicators. Duplex installations shall use remote start switches that include an amber 'PLANT FAULT' indicator. This shall illuminate, if either pump is set to 'HAND', or if one of the overloads trip. A red 'PLANT EMERGENCY' indicator shall also be provided and shall illuminate on all remote start switch panels if the vacuum level falls below the pressure switch set point level when the pump has been called. Where a duplex system is installed each pump shall be controlled by a separate motor control panel to enable servicing of either pump or control gear whilst maintaining system operation. Volt free relay kits for replicating alarm conditions to BMS shall be available as an optional extra. To be either installed either at factory or as a retro-fit kit for onsite installation.

2.10 OXYGEN MANIFOLD

2.11 LIQUID OXYGEN STORAGE TANK

- A. Inner Container: ASTM A666, Type 304 stainless steel welded tank, ASME labeled for pressure rating of 1700kPa.

- B. Outer Shell: Welded carbon steel conforming to ASME (BPV), with collapse rating of manufacturer recommended kPa.
- C. Insulation: Insulate annular space sufficient to insure maximum leak evaporation of 0.1 % kg of oxygen per 24 hours. Insulation shall not spark or burn when touched with glowing platinum wire in pure oxygen atmosphere.
- D. Supports: Adequate for installed and loaded forces of 1-1/2 times gravity vertical and 1/2 times gravity horizontal and for shipping empty, 3 times gravity.
- E. Valves and Fittings: Conform to NFPA 55 and ASME (BPV), with:
 - 1. Manway and cap.
 - 2. Liquid level gage,
 - 3. Inner container pressure gage, by-pass valve, vent valve.
 - 4. 95 percent tri-cock valve and gage valve.
 - 5. Thermocouple valve gage tube and thermocouple.
 - 6. Inner container relief valve
 - 7. Inner container bursting disc
 - 8. Bottom fill valve.
 - 9. Vent valve.
 - 10. Inlet bleed valve.
 - 11. Liquid fill connection.
 - 12. Pressurizer valve.
 - 13. Liquid withdrawal valve.
 - 14. Liquid-to-pump valve.
 - 15. Pump vapor return valve.
 - 16. Outer shell O-ring relief valve.
- F. Pipe and Fittings: ASTM A269, Type 304, stainless steel pipe and ASTM A403/A403M wrought stainless steel fittings; screwed or flanged valve, gage, and equipment joints.
- G. Tank Finish: Commercial sand blast clean and finish with primer coat and exterior white with green color code enamel finish.

2.12 AMBIENT AIR VAPORIZERS

- A. Aluminum extrusions and frame. Construction is welded base frame, internal and external finned extrusions, designed per ANSI B31.3 and meets UBC, chapter 23, 100mph winds and seismic zone4.
- B. Extrusion spacing: 04 inch
- C. Design for 08 hrs operation.

2.13 ALARM SYSTEM

- A. Manufacturers:
 - 1. Of international standard
- B. High-Low Pressure Alarm Panels: Closed circuit, self-monitoring type, to monitor oxygen, vacuum, compressed air, nitrous oxide and other gases.
 - 1. Green light for systems normal.

2. High or low pressure warning:
 - a. Green light extinguishes.
 - b. Audible warning device sounds.
 - c. Red light energizes.
 3. Gage indicates pressure or vacuum.
 4. Switch silences warning device.
 5. Test switch to test light bulbs and audible warning device.
 6. Provide system with internal switches, gages, control unit, and transformer.
- C. Multi-Signal Alarm Panel:
1. Closed circuit, self-monitoring type, to monitor oxygen, vacuum, compressed air, nitrous oxide, and nitrogen piping systems pressure or liquid level.
 2. Green light for systems normal.
 3. For abnormal condition:
 - a. Green light extinguishes.
 - b. Audible warning device sounds.
 - c. Red light energizes.
 4. Switch silences warning device.
 5. Test switch to test light bulbs and audible warning device.
 6. Design system such that one, two or more monitors may be connected to a single pressure switch.
 7. Monitor following abnormal conditions:
 - a. Oxygen reserve supply in use.
 - b. Oxygen line pressure high.
 - c. Oxygen line pressure low.
 - d. Air line pressure high.
 - e. Air line pressure low.
 - f. Air lag pump on.
 - g. Vacuum line pressure above normal.
 - h. Vacuum line pressure below normal.
 - i. Vacuum lag pump on
 - j. Nitrous oxide reserve supply in use.
 - k. Nitrous line pressure high.
 - l. Nitrous line pressure low.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with NFPA 99 and HTM-2022.
- B. Pre-Installation Cleaning: Disassemble positive pressure gas systems pipe, fittings, valves, and components, except those supplied cleaned and prepared for intended service, and thoroughly wash in hot solution of sodium carbonate or trisodium phosphate mixed 1 kg to 25 L of water. After washing, rinse with water, dry and cap until installation.
- C. Braze joints in pipe and tubing. Avoid leaving excess flux inside of pipe and fittings. During brazing of pipe connections, purge interior of pipe continuously with nitrogen.

- D. Effect changes in size with reducing fittings. Make changes in direction of required turns or offsets with fittings or tubing shaped by bending tools. Make bends free of flattening, buckling or thinning of tube wall.
- E. Cut pipe and tubing accurately and install without springing or forcing.
- F. Encase buried oxygen piping in cast-iron pipe. Provide with FM listed heat trace with fixed temperature regulation, set for 27 degrees C maximum, and terminating at junction box, mounted near main oxygen supply shut-off valve. Insulate buried oxygen lines and heat trace with insulation as specified in Section 22 0719.
- G. Grade piping down in direction of flow.
- H. Provide pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Finish flush at both ends. Extend 50 mm above finished floors. Pack space between pipe or tubing and sleeve, and calk.
- I. Identify piping with tape and decals. Provide piping identification code and schematic for installation under provisions of Section 22 0553. Install labeling on pipe at intervals of not more than 6 meters and at least once in each room and each story traversed by pipeline.
- J. Excavate and backfill pipe trenches as specified in Section 31 2316 and Section 31 2323. Coordinate provision of utility warning and identification tape with backfill operation. Provide above all buried lines at a depth of 200 to 300 mm below finish grade.
- K. Support gas piping with pipe hooks or hangers suitable for size of pipe, spaced:
 - 1. 13 mm pipe or tubing: 1830 mm.
 - 2. 20 mm or 25 mm pipe or tubing: 2440 mm.
 - 3. 30 mm or larger (horizontal): 3050 mm.
 - 4. 30 mm or larger (vertical): Every floor level.
- L. Install underground piping in trenches minimum 1070 mm deep adequately protected against physical damage and corrosion or in ducts and tunnels that are not occupied by fuel oil lines and are vented.
- M. Install strainers on inlet side of pressure reducing valves. Provide main gas valves (pressure reducing or flow control) with by-passes and isolation valves to permit maintenance without interruption of gas.
- N. Provide a valved by-pass around receivers.
- O. Vibration and Noise Isolation: Refer to Section 22 0548.
- P. Medical Air Compressor Systems: Isolate systems including receivers, dryers, and filters until after completion and approval of purity tests for compressed air system. Tie-in at flange or union joint.
- Q. Install bulk liquid oxygen system to NFPA 55 and under supervision of manufacturer. Size liquid oxygen tank's concrete foundation and tank anchoring for 3 times fully loaded weight. Provide bulk liquid oxygen systems with shut-off valve and connection point with valve for portable emergency oxygen supply. Install bulk oxygen to inlet side of oxygen manifold.

- R. Provide electric motor drive equipment with electrical equipment and wiring. Refer to Section 26 2717.

3.02 PIPING SYSTEMS CLEANING AND PRESSURE TESTING

- A. After erection of pipe and tubing but prior to installation of service outlet valves, blow systems clear of free moisture and foreign matter with nitrogen gas.
- B. Install service outlet valves, subject system to test pressure of 1034 kPa with nitrogen or dry compressed air. Check with soapy water. Provide 24-hour standing pressure test.

3.03 FIELD QUALITY CONTROL

- A. Independent testing agency to certify system is complete, zone valves installed, alarm systems functional, and tests performed. Document tests and submit.
- B. Reduce pressure in piping systems other than system under investigation to atmospheric.
- C. Test system with dry compressed air or dry nitrogen with test pressure in piping system at 345 kPa.
- D. Check each station outlet of every piping system to determine test gas is dispensed only from outlet of system under investigation. Measure pressure with gage attached to specific adaptor. Do not use universal adaptors.
- E. Disconnect test gas and connect proper gas to each system. Purge entire system to remove test gas. Check with analyzer suitable for gas installed.

END OF SECTION