REPUBLIC OF KENYA

MINISTRY OF TRANSPORT, INFRASTRUCTURE, HOUSING AND URBAN DEVELOPMENT

(STATE DEPARTMENT OF PUBLIC WORKS)

PROPOSED ERECTION AND COMPLETION OF A WARD BLOCK AT MERU COUNTY LEVEL 5 HOSPITAL (PHASE 1)

W.P ITEM NO.D108/EN/MRU 1601 -JOB NO.0397F

SPECIFICATIONS AND BILLS OF QUANTITIES

FOR

SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF MEDICAL GASES PIPELINE AND EQUIPMENT WORKS

PROJECT MANAGER
WORKS SECRETARY
STATE DEPARTMENT OF PUBLIC WORKS
P.O. Box 30743-00100
Nairobi

ARCHITECT
Chief Architect,
State Department of Public Works
P.O. Box 30743-00100
Nairobi

ELECTRICAL ENGINEER
Chief Engineer(Electrical),
State Department of Public Works,
P.O. Box 41191-00100
Nairobi

QUANTITY SURVEYOR
Chief Quantity Surveyor,
State Department of Public Works
P.O. Box 30743-00100
Nairobi

MECHANICAL ENGINEER
Chief Engineer(Mechanical-BS)
State Department of Public Works
P.O. Box 41191-00100
Nairobi

STRUCTURAL ENGINEER
Chief Engineer(Structural),
State Department of Public Works
P.O. Box 30743-00100
Nairobi

CLIENT
Chief Officer, Health
County Government of Meru
P.O. Box 120-60200
Meru.

JULY, 2018

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DEFINITIONS

The following terms and expressions used in the contract document shall have the following meanings:

The Employer	The County Government of Meru Represented by: **Chief Officer, Health** County Government of Meru P.O. Box 120-60200 Meru.
Project Manager	Works Secretary State Department of Public Works P.O. Box 30743-00100, Nairobi
Architect	Chief Architect State Department of Public Works P.O. Box 30743-00100 NAIROBI
Mechanical Engineer	Chief Engineer Mechanical (BS) State Department of Public Works P.O. Box 41191-00100 NAIROBI
Electrical Engineer	Chief Engineer Electrical (BS) State Department of Public Works P.O. Box 41191-00100 NAIROBI
Quantity Surveyor	Chief Quantity Surveyor State Department of Public Works P.O. Box 30743-00100 NAIROBI
Structural Engineer	Chief Engineer (Structural) State Department of Public Works P.O. Box 30743-00100 NAIROBI
Employer's representative	This shall mean the Project Manager and shall be Project Manager State Department of Public Works P.O. Box 30743-00100 NAIROBI
Main contractor	The firm appointed to carry out the builders works.
Sub contractor	The firm appointed to carry out the supply, delivery, installation, testing and commissioning of medical gases works

SPECIAL NOTES

1. These notes shall form part of the Instructions to Tenderers and Conditions of Contract.

2. The tenderer is required to check the number of pages in this document and should he find any missing, or in duplicate, or indistinct he should inform the Chief Engineer Mechanical (BS), State Department of Public Works, Ministry of Transport, Infrastructure, Housing and Urban Development.

3. Should the tenderer be in any doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform the Chief Engineer Mechanical (BS), State Department of Public Works, Ministry of Transport, Infrastructure, Housing and Urban Development, in order that the correct meaning may be decided before the date of submission of tender.

4. No liability will be admitted nor claim allowed, in respect of errors in the tender due to mistakes in the specification, which should have been rectified in the manner, described above.

5. All tenderers must make a declaration that they have not and will not make any payment to any person which can be perceived as an inducement to enable them to win this tender.

6. Any tenderer whose firm uses the titles "Engineer" and "Engineers" must produce evidence of registration of at least one of the directors by the Engineers Registration Board of Kenya to avoid disqualification.

FORM OF TENDER

To: Chief Officer, Health
County Government of Meru
P.O. Box 120-60200
Meru.

Date:…….....,

Dear Sir/Madam,

Supply, Delivery, Installation, Testing and Commission of medical gases installation, for the Proposed Erection and Completion of a Ward Block at Meru County Level 5 Hospital (Phase 1), Meru County.

1. In accordance with the Instructions to Tenderers, Conditions of Contract, Specifications and Bills of Quantities for the execution of the above named Works, we, the undersigned offer to construct, install and complete such Works and remedy any defects therein for the sum of:

   Kshs……..*[**Amount in figures]***

   Kenya Shillings……...
   ……..
   ……*[**Amount in words]***
2. We undertake, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Employer's Representative's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Conditions of Contract.

3. We agree to abide by this tender for **a period of 120 days from the date of tender opening** and shall remain binding upon us and may be accepted at any time before that date.

4. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us.

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

Dated this …….. day of ……20…..

Signature …….in the capacity of …….

duly authorized to sign tenders for and on behalf of:

……..*[**Name of Tenderer**]*

of……..[***Address of Tenderer****]*

PIN No. ……..

VAT CERTIFICATE No. ……

Witness: Name …….

Address …….

Signature ……

Date ……

FORM OF TENDER SECURITY
Appendix I

To: Chief Officer, Health
County Government of Meru
P.O. Box 120-60200
Meru.

Date:…….....,

WHEREAS …… (hereinafter called "the Tenderer") has submitted his tender dated ……. For **Supply, Delivery, Installation, Testing and Commission of medical gases installation works for the Proposed Erection and Completion of a Ward Block at Meru County Level 5 Hospital (Phase 1), Meru County.**
KNOW ALL PEOPLE by these presents that WE ……....
Having our registered office at
……..…….
(hereinafter called "the Bank'), are bound unto
……..……
(hereinafter called "the Employer") in the sum of Kshs…….……
for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents sealed with the Common Seal of the said Bank this
……Day of …….20 ……

THE CONDITIONS of this obligation are:

1. If after tender opening the Tenderer withdraws his tender during the period of tender validity specified in the instructions to Tenderers
   Or
2. If the Tenderer, having been notified of the acceptance of his tender by the Employer during the period of tender validity:

   (a) fails or refuses to execute the form of Agreement in accordance with the Instructions to Tenderers, if required; or

   (b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Tenderers;

   We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by his is due to him, 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 **one hundred and fifty (150) days** after the day of tender opening, and any demand in respect thereof should reach the Bank not later than the said date.

   …….. ……
   (date) ***(signature of the Bank)***

   …… ……..
   (witness) (seal)

FORM OF TENDER SECURITY

Appendix II

To: Chief Officer, Health
County Government of Meru
P.O. Box 120-60200
Meru.

Date:…….....,

WHEREAS..... (hereinafter called "the Tenderer") has submitted his tender dated. ……. Supply, Delivery, Installation, Testing and Commission of Medical gases installation, works for the Proposed Erection and Completion of a Ward Block at Meru County Level 5 Hospital (Phase 1), Meru County. KNOW ALL PEOPLE by these presents that WE.....of…….……..(Name of Insurance Company)...having our registered office at .....(hereinafter called " the Guarantor"), are bound unto .....(hereinafter called "the Procuring Entity" in the sum of Kshs.....for which payment well and truly to be made to the said Procuring Entity , the Guarantor bind itself, its successors and assigns by these presents sealed with the Common Seal of the said Guarantor this .....Day of .....20.....
THE CONDITIONS of this obligation are:

1. If after tender opening the tenderer withdraws his tender during the period of tender validity specified in the instructions to tenderers
   Or

2. If the tenderer, having been notified of the acceptance of this tender by the Employer during the period of tender validity:

   a) fails or refuses to execute the form of Agreement in accordance with the Instructions to Tenderers, if required; or

   b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Tenderers;

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

This guarantee will remain in force for a period of 150 days from the date of tender opening, and any demand in respect thereof should reach the Guarantor not later than the said date.

_____ _____
[date] [signature of the Guarantor]

_____ _____
[witness] [seal]

SECTION A:

INSTRUCTIONS TO TENDERERS.

INSTRUCTIONS TO TENDERERS

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INSTRUCTION TO TENDERERS

Note: The tenderer must comply with the following conditions and instructions and failure to do so is liable to result in rejection of the tender.

GENERAL

1. Definitions

(a) "**Tenderer"** means any person or persons partnership firm or company submitting a sum or sums in the Bills of Quantities in accordance with the Instructions to Tenderers, Conditions of Contract Parts I and II, Specifications, Drawings and Bills of Quantities for the work contemplated, acting directly or through a legally appointed representative.

(b) **"Approved tenderer**" means the tenderer who is approved by the Employer.

(c) Any noun or adjective derived from the word **"tender"** shall be read and construed to mean the corresponding form of the noun or adjective **"bid".** Any conjugation of the verb "tender" shall be read and construed to mean the corresponding form of the verb "bid."

(d) **"Employer"** means a Central Government Ministry, Local Authority, State Corporation or any other Public Institution.

2. Eligibility and Qualification Requirements

2.1 This invitation to tender is open to all tenderers who have been prequalified.

2.2 To be eligible for award of Contract, the tenderer shall provide evidence satisfactory to the Employer of their eligibility under Sub clause 2.1 above and of their capability and adequacy of resources to effectively carry out the subject Contract. To this end, the tenderer shall be required to update the following information already submitted during prequalification:-

(a) Details of experience and past performance of the tenderer on the works of a similar nature within the past five years and details of current work on hand and other contractual commitments.

(b) The qualifications and experience of key personnel proposed for administration and execution of the contract, both on and off site.

(c) Major items of construction plant and equipment proposed for use in carrying out the Contract. Only reliable plant in good working order and suitable for the work required of it shall be shown on this schedule. The tenderer will also indicate on this schedule when each item will be available on the Works. Included also should be a schedule of plant, equipment and material to be imported for the purpose of the Contract, giving details of make, type, origin and CIF value as appropriate.

(d) Details of subcontractors to whom it is proposed to sublet any portion of the Contract and for whom authority will be requested for such subletting in accordance with clause 4 of the Conditions of Contract.

(e) A draft Program of Works in the form of a bar chart and Schedule of Payment which shall form part of the Contract if the tender is accepted. Any change in the Program or Schedule shall be subjected to the approval of the Engineer.

(f) Details of any current litigation or arbitration proceedings in which the Tenderer is involved as one of the parties.

2.3 Joint Ventures

Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements:-

(a) The tender, and in case of a successful tender, the Form of Agreement, shall be signed so as to be legally binding on all partners.

(b) One of the partners shall be nominated as being in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners.

(c) The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the Contract including payment shall be done exclusively with the partner in charge.

(d) All partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Form of Tender and the Form of Agreement (in case of a successful tender).

(e) A copy of the agreement entered into by the joint venture partners shall be submitted with the tender.

3. Cost of Tendering

The tenderer shall bear all costs associated with the preparation and submission of his tender and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

4. Site Visit

4.1 The tenderer is advised to visit and examine the Site and its surroundings and obtain for himself on his own responsibility, all information that may be necessary for preparing the tender and entering into a contract. The costs of visiting the Site shall be the tenderer's own responsibility.

4.2 The tenderer and any of his personnel or agents will be granted permission by the Employer to enter upon premises and lands for the purpose of such inspection, but only upon the express condition that the tenderer, his personnel or agents, will release and indemnify the Employer from and against all liability in respect of, and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused, which but for the exercise of such permission, would not have arisen.

4.3 The Employer shall organize a site visit at a date to be notified. A representative of the Employer will be available to meet the intending tenderers at the Site.

Tenderers must provide their own transport. The representative will not be available at any other time for site inspection visits.

Each tenderer shall complete the Certificate of Tenderer's Visit to the Site, whether he in fact visits the Site at the time of the organized site visit or by himself at some other time.

TENDER DOCUMENTS

5. Tender Documents

5.1 The Tender documents comprise the documents listed here below and should be read together with any Addenda issued in accordance with Clause 7 of these instructions to tenderers.

a. Form of Invitation for Tenders
b. Instructions to Tenderers
c. Form of Tender
d. Appendix to Form of Tender
e. Form of Tender Surety
f. Statement of Foreign Currency Requirements
g. Form of Performance Security
h. Form of Agreement
i. Form of Advance payment Bank Guarantee
j. Schedules of Supplementary Information
k. General Conditions of Contract – Part I
l. Conditions of Particular Application – Part II
m. Specifications
n. Bills of Quantities
o. Drawings

5.2 The tenderer is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the tender documents. Failure to comply with the requirements for tender submission will be at the tenderer's own risk. Pursuant to clause 22 of Instructions to Tenderers, tenders which are not substantially responsive to the requirements of the tender documents will be rejected.

5.3 All recipients of the documents for the proposed Contract for the purpose of submitting a tender (whether they submit a tender or not) shall treat the details of the documents as "private and confidential".

6. Clarification of Tender Documents

6.1 A prospective tenderer requiring any clarification of the tender documents may notify the Employer in writing or by telex, cable or facsimile at the Employer's mailing address indicated in the Invitation to Tender. The Employer will respond in writing to any request for clarification which he receives earlier than 28 days prior to the deadline for the submission of tenders. Written copies of the Employer's response (including the query but without identifying the source of the inquiry) will be sent to all prospective tenderers who have purchased the tender documents.

7. Amendment of Tender Documents

7.1 At any time prior to the deadline for submission of tenders the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective tenderer, modify the tender documents by issuing Addenda.

7.2 Any Addendum will be notified in writing or by cable, telex or facsimile to all prospective tenderers who have purchased the tender documents and will be binding upon them.

7.3 If during the period of tendering, any circular letters (tender notices) shall be issued to tenderers by, or on behalf of, the Employer setting forth the interpretation to be paced on a part of the tender documents or to make any change in them, such circular letters will form part of the tender documents and it will be assumed that the tenderer has taken account of them in preparing his tender. The tenderer must promptly acknowledge any circular letters h may receive.

7.4 In order to allow prospective tenderers reasonable time in which to take the Addendum into account in preparing their tenders, the Employer may, at his discretion, extend the deadline for the submission of tenders.

PREPARATION OF TENDERS

8. Language of Tender

8.1 The tender and all correspondence and documents relating to the tender exchanged between the tenderer and the Employer shall be written in the English language. Supporting documents and printed literature furnished by the tenderer with the tender may be in another language provided they are accompanied by an appropriate translation of pertinent passages in the above stated language. For the purpose of interpretation of the tender, the English language shall prevail.

9. Documents Comprising the Tender

9.1 The tender to be prepared by the tenderer shall comprise: the Form of Tender and Appendix thereto, a Tender Surety, the Priced Bills of Quantities and Schedules, the information on eligibility and qualification, and any other materials required to be completed and submitted in accordance with the Instructions to Tenderers embodied in these tender documents. The Forms, Bills of Quantities and Schedules provided in the tender documents shall be used without exception (subject to extensions of the schedules in the same format and to the provisions of clause 13.2 regarding the alternative forms of Tender Surety].

10. Tender Prices

10.1 All the insertions made by the tenderer shall be made in INK and the tenderer shall clearly form the figures. The relevant space in the Form of Tender and Bills of Quantities shall be completed accordingly without interlineations or erasures except those necessary to correct errors made by the tenderer in which case the erasures and interlineations shall be initialed by the person or persons signing the tender.

10.2 A price or rate shall be inserted by the tenderer for every item in the Bills of Quantities whether the quantities are stated or not items against which no rate or price is entered by the tenderer will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bills of Quantities.

The prices and unit rates in the Bills of Quantities are to be the full [all-inclusive] value of the work described under the items, including all costs and expenses which may be necessary and all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based. All duties and taxes and other levies payable by the Contractor under the Contract or for any other cause as of the date 28 days prior to the deadline for the submission of tenders, shall be included in the rates and prices and the total tender prices submitted by the Tenderer.

Each price or unit rate inserted in the Bills of Quantities should be a realistic estimate for completing the activity or activities described under that particular item and the tenderer is advised against inserting a price or rate against any item contrary to this instruction.

Every rate entered in the Bills of Quantities, whether or not such rate be associated with a quantity, shall form part of the Contract. The Employer shall have the right to call for any item of work contained in the Bills of Quantities, and such items of work to be paid for at the rate entered by the tenderer and it is the intention of the Employer to take full advantage of unbalanced low rates.

10.3 Unless otherwise specified the tenderer must enter the amounts representing 10% of the sub-total of the summary of the Bills of Quantities for Contingencies and Variation of Prices [V.O.P.] payments in the summary sheet and add them to the sub-total to arrive at the tender amount.

10.4 The tenderer shall furnish with his tender written confirmation from his suppliers or manufacturers of unit rates for the supply of items listed in the Conditions of Contract clause 47 where appropriate.

10.5 The rates and prices quoted by the tenderer are subject to adjustment during the performance of the Contract only in accordance with the provisions of the Conditions of Contract. The tenderer shall complete the schedule of basic rates and shall submit with his tender such other supporting information as required under clause 47 of the Conditions of Contract Part II.

11. Currencies of Tender and Payment

11.1 Tenders shall be priced in Kenya Shillings and the tender sum shall be in Kenya Shillings.

11.2 Tenderers are required to indicate in the Statement of Foreign Currency Requirements, which forms part of the tender, the foreign currency required by them. Such currency should generally be the currency of the country of the tenderer's main office. However, if a substantial portion of the tenderer's expenditure under the Contract is expected to be in countries other than his country of origin, then he may state a corresponding portion of the contract price in the currency of those other countries. However, the foreign currency element is to be limited to two (2) different currencies and a maximum of 30% (thirty percent) of the Contract Price.

11.3 The rate of rates of exchange used for pricing the tender shall be selling rate or rates of the Central Bank ruling on the date thirty (30) days before the final date for the submission of tenders.

11.4 Tenderers must enclose with their tenders, a brief justification of the foreign currency requirements stated in their tenders.

12. Tender Validity

12.1 The tender shall remain valid and open for acceptance for a period of one hundred and twenty (120) days from the specified date of tender opening or from the extended date of tender opening (in accordance with clause 7.4 here above) whichever is the later.

12.2 In exceptional circumstances prior to expiry of the original tender validity period, the Employer may request the tenderer for a specified extension of the period of validity. The request and the responses thereto shall be made in writing or by cable, telex or facsimile. A tenderer may refuse the request without forfeiting his Tender Surety. A tenderer agreeing to the request will not be required nor permitted to modify his tender, but will be required to extend the validity of his Tender Surety correspondingly.

13. Tender Surety

13.1 The tenderer shall furnish as part of his tender, a Tender Surety in the amount stated in the Appendix to Instructions to Tenderers.

13.2 The unconditional Tender Surety shall be in Kenya Shillings and be in form of a certified cheque, a bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank approved by the Employer located in the Republic of Kenya.

The format of the Surety shall be in accordance with the sample form of Tender Surety included in these tender documents; other formats may be permitted subject to the prior approval of the Employer. The Tender Surety shall be valid for twenty eight (28) days beyond the tender validity period.

13.3 Any tender not accompanied by an acceptable Tender Surety will be rejected by the Employer as non-responsive.

13.4 The Tender Sureties of unsuccessful tenderers will be returned as promptly as possible but not later than twenty eight (28) days after concluding the Contract execution and after a Performance Security has been furnished by the successful tenderer. The Tender Surety of the successful tenderer will be returned upon the tenderer executing the Contract and furnishing the required Performance Security.

13.5 The Tender Surety may be forfeited:

(a) if a tenderer withdraws his tender during the period of tender validity: or

(b) in the case of a successful tenderer, if he fails

(i) to sign the Agreement, or
(ii) to furnish the necessary Performance Security

(c) if a tenderer does not accept the correction of his tender price pursuant to clause 23.

14. No Alternative Offers

14.1 The tenderer shall submit an offer which complies fully with the requirements of the tender documents.

Only one tender may be submitted by each tenderer either by himself or as partner in a joint venture.

14.2 The tenderer shall not attach any conditions of his own to his tender. The tender price must be based on the tender documents. The tenderer is not required to present alternative construction options and he shall use without exception, the Bills of Quantities as provided, with the amendments as notified in tender notices, if any, for the calculation of his tender price.

Any tenderer who fails to comply with this clause will be disqualified.

15. Pre-Tender Meeting

15.1 The tenderer's designated representative is invited to attend a pre-tender meeting, which if convened, will take place at the venue and time stated in the Invitation to Tender. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

15.2 The tenderer is requested as far as possible to submit any questions in writing or by cable, to reach the Employer not later than seven days before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted in accordance with the following:

(a) Minutes of the meeting, including the text of the questions raised and the responses given together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the tender documents. Any modification of the tender documents listed in --Clause 9 which may become necessary as a result of the pre-tender meeting shall be made by the Employer exclusively through the issue of a tender notice pursuant to Clause 7 and not through the minutes of the pre-tender meeting.

(b) Non-attendance at the pre-tender meeting will not be cause for disqualification of a bidder.

16. Format and Signing of Tenders

16.1 The tenderer shall prepare his tender as outlined in clause 9 above and mark appropriately one set "ORIGINAL" and the other "COPY".

16.2 The copy of the tender and Bills of Quantities shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the tenderer. Proof of authorization shall be furnished in the form of the written power of attorney which shall accompany the tender. All pages of the tender where amendments have been made shall be initialed by the person or persons signing the tender.

16.3 The complete tender shall be without alterations, interlineations or erasures, except as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person of persons signing the tender.

SUBMISSION OF TENDERS

17. Sealing and Marking of Tenders

17.1 The tenderer shall seal the original and copy of the tender in separated envelopes, duly marking the envelopes as "ORIGINAL" and "COPY". The envelopes shall then be sealed in an outer envelope.

17.2 The inner and outer envelopes shall be addressed to the Employer at the address stated in the Appendix to Instructions to Tenderers and bear the name and identification of the Contract stated in the said Appendix with a warning not to open before the date and time for opening of tenders stated in the said Appendix.

17.3 The inner envelopes shall each indicated the name and address of the tenderer to enable the tender to be returned unopened in case it is declared "late", while the outer envelope shall bear no mark indicating the identity of the tenderer.

17.4 If the outer envelope is not sealed and marked as instructed above, the Employer will assume no responsibility for the misplacement or premature opening of the tender. A tender opened prematurely for this cause will be rejected by the Employer and returned to the tenderer.

18 Deadline for Submission of Tenders

18.1 Tenders must be received by the Employer at the address specified in clause 17.2 and on the date and time specified in the Letter of Invitation, subject to the provisions of clause 7.4, 18.2 and 18.3.

Tenders delivered by hand must be placed in the "tender box" provided in the office of the Employer.

Proof of posting will not be accepted as proof of delivery and any tender delivered after the above stipulated time, from whatever cause arising will not be considered.

18.2 The Employer may, at his discretion, extend the deadline for the submission of tenders through the issue of an Addendum in accordance with clause 7, in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline shall thereafter be subject to the new deadline as extended.

18.3 Any tender received by the Employer after the prescribed deadline for submission of tender will be returned unopened to the tenderer.

19 Modification and Withdrawal of Tenders

19.1 The tenderer may modify or withdraw his tender after tender submission, provided that written notice of the modification or withdrawal is received by the Employer prior to prescribed deadline for submission of tenders.

19.2 The tenderer's modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions for

the submission of tenders, with the inner and outer envelopes additionally marked "MODIFICATION" or "WITHDRAWAL" as appropriate.

19.3 No tender may be modified subsequent to the deadline for submission of tenders.

19.4 No tender may be withdrawn in the interval between the deadline for submission of tenders and the period of tender validity specified on the tender form. Withdrawal of a tender during this interval will result in the forfeiture of the Tender Surety.

19.5 Subsequent to the expiration of the period of tender validity prescribed by the Employer, and the tenderer having not been notified by the Employer of the award of the Contract or the tenderer does not intend to conform with the request of the Employer to extend the prior of tender validity, the tenderer may withdraw his tender without risk of forfeiture of the Tender Surety.

TENDER OPENING AND EVALUATION

20 Tender Opening

20.1 The Employer will open the tenders in the presence of the tenderers' representatives who choose to attend at the time and location indicated in the Letter of Invitation to Tender. The tenderers' representatives who are present shall sign a register evidencing their attendance.

20.2 Tenders for which an acceptable notice of withdrawal has been submitted, pursuant to clause 19, will not be opened. The Employer will examine the tenders to determine whether they are complete, whether the requisite Tender Sureties have been furnished, whether the documents have been properly signed and whether the tenders are generally in order.

20.3 At the tender opening, the Employer will announce the tenderer's names, total tender price, tender price modifications and tender withdrawals, if any, the presence of the requisite Tender Surety and such other details as the Employer, at his discretion, may consider appropriate. No tender shall be rejected at the tender opening except for late tenders.

20.4 The Employer shall prepare minutes of the tender opening including the information disclosed to those present.

20.5 Tenders not opened and read out a tender opening shall not be considered further for evaluation, irrespective of the circumstances.

21 Process to be Confidential

21.1 After the public opening of tenders, information relating to the examination, clarification, evaluation and comparisons of tenders and recommendations concerning the award of Contract shall not be disclosed to tenderers or other persons not officially concerned with such process until the award of Contract is announced.

21.2 Any effort by a tenderer to influence the Employer in the process of examination, evaluation and comparison of tenders and decisions concerning award of Contract may result in the rejection of the tenderer's tender.

22 Clarification of Tenders

22.1 To assist in the examination, evaluation and comparison of tenders, the Employer may ask tenderers individually for clarification of their tenders, including breakdown of unit prices. The request for clarification and the response shall be in writing or by cable, facsimile or telex, but no change in the price or substance of the tender shall be sought, offered or permitted except as required to confirm the correction of arithmetical errors discovered by the employer during the evaluation of the tenders in accordance with clause 24.

22.2 No Tenderer shall contact the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. If the tenderer wishes to bring additional information to the notice of the Employer, he shall do so in writing.

23 Determination of Responsiveness

23.1 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender is substantially responsive to the requirements of the tender documents.

23.2 For the purpose of this clause, a substantially responsive tender is one which conforms to all the terms, conditions and specifications of the tender documents without material deviation or reservation and has a valid bank guarantee. A material deviation or reservation is one which affects in any substantial way the scope, quality, completion timing or administration of the Works to be undertaken by the tenderer under the Contract, or which limits in any substantial way, inconsistent with the tender documents, the Employer's rights or the tenderers obligations under the Contract and the rectification of which would affect unfairly the competitive position of other tenderers who have presented substantially responsive tenders.

23.3 Each price or unit rate inserted in the Bills of Quantities shall be a realistic estimate of the cost of completing the works described under the particular item including allowance for overheads, profits and the like. Should a tender be seriously unbalanced in relation to the Employer's estimate of the works to be performed under any item or groups of items, the tender shall be deemed not responsive.

23.4 A tender determined to be not substantially responsive will be rejected by the Employer and may not subsequently be made responsive by the tenderer by correction of the non-conforming deviation or reservation.

24 Correction of Errors

Tenders determined to be substantially responsive shall be checked by the Employer for any arithmetic errors in the computations and summations. Errors will be corrected by the Employer as follows:

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

(b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there is an obvious typographical error, in which case adjustment will be made to the entry containing that error.

(c) The amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and, with concurrence of the tenderer, shall be considered as binding upon the tenderer. If the tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security may be forfeited in accordance with clause 13.

25 Conversion to Single Currency

25.1 For compensation of tenders, the tender price shall first be broken down into the respective amounts payable in various currencies by using the selling rate or rates of the Central Bank of Kenya ruling on the date twenty eight (28) days before the final date for the submission of tenders.

25.2 The Employer will convert the amounts in various currencies in which the tender is payable (excluding provisional sums but including Day works where priced competitively) to Kenya Shillings at the selling rates stated in clause 25.1.

26 Evaluation and Comparison of Tenders

26.1 The Employer will evaluate only tenders determined to be substantially responsive to the requirements of the tender documents in accordance with clause 23.

26.2 In evaluating tenders, the Employer will determine for each tender the evaluated tender price by adjusting the tender price as follows:

(a) Making any correction for errors pursuant to clause 24.

(b) Excluding Provisional Sums and provision, if any, for Contingencies in the Bills of Quantities, but including Day works where priced competitively.

26.3 The Employer reserves the right to accept any variation, deviation or alternative offer. Variations, deviations, alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in the accrual of unsolicited benefits to the Employer, shall not be taken into account in tender evaluation.

26.4 Price adjustment provisions in the Conditions of Contract applied over the period of execution of the Contract shall not be taken into account in tender evaluation.

26.5 If the lowest evaluated tender is seriously unbalanced or front loaded in relation to the Employer's estimate of the items of work to be performed under the Contract, the Employer may require the tenderer to produce detailed price analyses for any or all items of the Bills of Quantities, to demonstrate the relationship between those prices, proposed construction methods and schedules. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in clause 29 be increased at the expense of the successful tenderer to a level sufficient to protect the Employer against financial loss in the event of subsequent default of the successful tenderer under the Contract.

26.6 Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital shall be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding Provisional Sums to a non-indigenous sub-contractor.

AWARD OF CONTRACT

27 Award

27.1 Subject to clause 27.2, the Employer will award the Contract to the tenderer whose tender is determined to be substantially responsive to the tender documents and who has offered the lowest evaluated tender price subject to possessing the capability and resources to effectively carry out the Contract Works.

27.2 The Employer reserves the right to accept or reject any tender, and to annual the tendering process and reject all tenders, at any time prior to award of Contract, without thereby incurring any liability to the affected tenderers or any obligation to inform the affected tenderers of the grounds for the Employer's action.

28 Notification of Award

28.1 Prior to the expiration of the period of tender validity prescribed by the Employer, the Employer will notify the successful tenderer by cable, telefax or telex and confirmed in writing by registered letter that his tender has been accepted. This letter (hereinafter and in all Contract documents called "Letter of Acceptance") shall name the sum (hereinafter and in all Contract documents called "the Contract Price") which the Employer will pay to the Contractor in consideration of the execution and completion of the Works as prescribed by the Contract.

28.2 Notification of award will constitute the formation of the Contract.

28.3 Upon the furnishing of a Performance Security by the successful tenderer, the unsuccessful tenderers will promptly be notified that their tenders have been unsuccessful.

28.4 Within twenty eight [28] days of receipt of the form of Contract Agreement from the Employer, the successful tenderer shall sign the form and return it to the Employer together with the required Performance Security.

29 Performance Guarantee

29.1 Within twenty eight [28] days of receipt of the notification of award from the Employer, the successful tenderer shall furnish the Employer with a Performance Security in an amount stated in the Appendix to Instructions to Tenderers.

29.2 The Performance Security to be provided by the successful tenderer shall be an unconditional Bank Guarantee issued at the tenderer's option by an established and a reputable Bank approved by the Employer and located in the Republic of Kenya and shall be divided into two
elements namely, a performance security payable in foreign currencies (based upon the exchange rates determined in accordance with clause 35.4 of the Conditions of Contract) and a performance security payable in Kenya Shillings. The value of the two securities shall be in the same proportions of foreign and local currencies as requested in the form of foreign currency requirements.

29.3 Failure of the successful tenderer to lodge the required Performance Security shall constitute a breach of Contract and sufficient grounds for the annulment of the award and forfeiture of the Tender Security and any other remedy under the Contract the Employer may award the Contract to the next ranked tenderer.

30 Advance Payment

An advance payment, if approved by the Employer, shall be made under the Contract, if requested by the Contractor, in accordance with clause 33.1 of the Conditions of Contract. The Advance Payment Guarantee shall be denominated in the proportion and currencies named in the form of foreign currency requirements. For each currency, a separate guarantee shall be issued. The guarantee shall be issued by a bank located in the Republic of Kenya, or a foreign bank through a correspondent bank located in the Republic of Kenya, in either case subject to the approval of the Employer.

APPENDIX TO INSTRUCTIONS TO TENDERERS
1.CLAUSE 2.1

Change to read "This invitation Tender is open to all tenderers in the category specified."

2. OMIT

Clauses 4.3, 5.1 (a), (d), (f),(h), (i), (j),10.4,11.2, 11.3,11.4,25,30

3. ADD TO CLAUSE 13.1

Amount of tender surety will be Kshs. 200,000.00 or as indicated in the tender advertisement notice

4. ADD TO CLAUSE 13.2

(i) The bid security shall be from a reputable Bank/Insurance Company.
(ii) Tender security to be valid for 150 day from the date of Tender opening.

5. ADD TO 29.1CLAUSE

Amount of performance security will be seven and a half per cent (5%)

6. AMEND CLAUSE 28.4 AND 29.1

Replace twenty eight (28) days with twenty one (21) days.

7. ADD TO CLAUSE 29.2

Performance security shall not be divided in two elements and shall be payable in Kenya Shillings Only.

8. ADD TO CLAUSE 24

(i) In the event of a discrepancy between the tender amount as stated in the form of tender and the corrected tender figure in the main summary of the bills of quantities the amount as stated in the form of tender shall prevail.

(ii) The correction factor shall be computed by expressing the difference between the amount and the corrected tender sum as a percentage of the corrected sub-contact works. (i.e. corrected tender sum less PC and provisional sums)

iii) The Error correction factor shall be applied to all sub-contract works (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.

9. ADD EVALUATION CRITERIA - Page (A-16) to (vi)

TENDER EVALUATION CRITERIA

After tender opening, the tenders will be evaluated in 3 stages, namely:

1. Determination of Responsiveness
2. Detailed Technical Examination
3. Combination of Technical and Tender Sums Comparison

STAGE 1- DETERMINATION OF RESPONSIVENESS

A) PRELIMINARY EXAMINATION

This stage of evaluation shall involve examination of the pre-qualification conditions as set out in the Tender Advertisement Notice or Letter of Invitation to Tender and any other conditions stated in the bid document.

These conditions may include the following:

i) Category of Registration with the National Construction Authority (NCA) in the relevant trade.

ii) Class of Licenses with the relevant statutory bodies e.g. Energy Regulatory Commission, Local Authorities, Water Management Boards etc.

iii) Proof of payment for tender document

iv) Provision of Bid Security

v) Dully filled Form of Tender

vi) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with clauses 13 and 23.2 of Instruction to Tenderers which states as follows:

- **Clause 13.1** of Instruction to Tenderers,"the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".

- **Clause 13.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank/ Insurance approved by PPOA located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".

- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

The tenderers who do not satisfy any of the above requirements shall be considered Non-Responsive and their tenders will not be evaluated further.

B) COMPLETENESS OF TENDER DOCUMENT

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 of Instruction to Tenderers, the tenderers will be required to provide evidence for eligibility of the award of the tender by satisfying the employer of their eligibility under sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

The award of points for the **STANDARD FORMS** considered in this section shall be as shown below

	PARAMETER	**MAXIMUM POINTS**
(i)	Statement of Compliance	3
(ii)	Tender Questionnaire	5
(iii)	Confidential Business Questionnaire	5
(iv)	Key personnel	15
(v)	Contract Completed in the last Five (5) years	15
(vi)	Schedules of on-going projects	10
(vii)	Schedules of contractors equipment	10
(viii)	Audited Financial Report for the last 3 years	10
(ix)	Evidence of Financial Resources	10
(x)	Name, Address and Telephone of Banks **(**Contractor to provide**)**	5
(xi)	Litigation History	2
(xii)	Sanctity of the tender document as in accordance with clause 5 of instruction to tenderer	10
	TOTAL	**100**

The detailed scoring plan shall be as shown in table 1 overleaf: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i	**Statement of Compliance** Signed and stamped ---------- 3 Signed but not stamped or vice versa---------- 2 Not signed nor stamped---------- 0		**3**	
ii	**Tender Questionnaire Form** Completely filled---------- 5 Partially filled---------- 3 Not filled----------0		**5**	
iii	**Confidential Business Questionnaire Form**. Completely filled---------- 5 Partially filled---------- 3 Not filled---------- 0		**5**	
iv	**Key Personnel (Attach evidence)**			**15**
	Director of the firm o Holder of degree or diploma in relevant Engineering field--4 o Holder of certificate in relevant Engineering field------3 o Holder of trade test certificate in relevant Engineering field----------2 o No relevant certificate----------0		**4**	
	At least 1No. degree/diploma of key personnel in relevant Engineering field o With over 10 years relevant experience ----------4 o With over 5 years relevant experience ---------- 3 o With under 5 years relevant experience ---------- 1		**4**	
	At least 1No certificate holder of key personnel in relevant Engineering field o With over 10 years relevant experience ---------- 3 o With over 5 years relevant experience ---------- 2 o With under 5 years relevant experience ----------1		**3**	
	At least 2No artisan (trade test certificate in relevant Engineering field) o Artisan with over 10 years relevant experience-------- 2 o Artisan with under 10 years relevant experience ----- 1 o Non skilled worker with over 10 years relevant experience—1		**4**	

v	**Contract completed in the last five (5) years (Max of 5 No. Projects**) o Project of similar nature, complexity and magnitude ----3 o Project of similar nature but of lower value than the one in consideration---------- 2 o No completed project of similar nature ---------- 0		**15**	
vi	**On-going projects (Max of 5 No. Projects)** o Project of similar nature, complexity and magnitude ----2 o Project of similar nature but of lower value than the one in consideration ----------1 o No ongoing project of similar nature----------0		**10**	
vii	**Schedule of contractors equipment and transport (proof or evidence of ownership)** o Means of transport (Vehicle)---------- 4 o No means of transport ---------- 0		4	**10**
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of equipment to be considered – 3 No.)----- 2		6	
viii	**Financial report** **Audited financial report (last three (3) years)** o Turn over greater or equal to 5 times the cost of the project ---------- 10 o Turn over greater or equal to 3 times the cost of the project ---------- 6 o Turn over greater or equal to cost of the project ------- 4 o Turn over below the cost of the project ---------- 2		**10**	
ix	**Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc)** o Has financial resources equal or above the cost of the project---------- 10 o Has financial resources below the cost of the project----5 o Has not indicated sources of financial resources --------0		**10**	
x	**Name, Address and Telephone of Banks (Contractor to provide)** o Provided ---------- 5 o Not provided---------- 0		**5**	
xi	**Litigation History** o Filled ----------2 o Not filled----------0		**2**	
xii	**Sanctity of the tender document** o Having the document intact (not tempered with in any way)----------10 o Having mutilated or modified the tender document-----0		**10**	
	TOTAL		**100**	

Any bidder who scores 60 points and above shall be considered for further evaluation

STAGE 2 - TECHNICAL EVALUATION

A) COMPLIANCE WITH TECHNICAL SPECIFICATIONS

In this section, the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

The tenderer shall fill in the Technical Schedule as specified in the tender document for Equipment and Items indicating the Country of Origin, Model/Make/Manufacturer of the Item/Equipment they propose to supply.

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

a) Standards of manufacture

b) Performance ratings/characteristics

c) Material of manufacture

d) Electrical power ratings and

e) Any other necessary requirements (Specify)

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

B) TECHNICAL EXAMINATION

In this section, the information provided in the Technical Schedule or Brochures attached will be analyzed for bidders who have qualified from **STAGE 2A** above and points awarded as shown below to a maximum of 70 points

TABLE 2

Item	Description	Score	Max. score
	Technical schedule/Brochures o Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied highlighted and meets specification (Where alternative are to supplied---------- 70 or o Completely filled Technical Schedule indicating Brand, Model/ Country of origin as per specification in the tender---------- 70 o Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied not highlighted but within range of those specified and meets specifications ---------- 55 or o Completely filled Technical Schedule indicating items as specified in the tender but less than 100% and above 75% of items in the technical provided ----------55 o Relevant Manufacturer Brochures for items in the technical schedule with equipments to be supplied but between 50%and 75% of items highlighted and within range of those specified and meets specifications ---------- 40 or o Completely filled Technical Schedule indicating items as specified in the tender but between 50%and 75% of items in the technical schedule provided----------40 o Relevant Manufacturer Brochures for between 25% and 50% of items in the technical schedule with equipments to be supplied highlighted and meets specifications---------- 25 or o for between 25% and 50%of Technical Schedule filled indicating Brand, Model/Country of origin for the items considered as specified in the tender ----------25 o Less than 25% provided or no technical data provided, either in form of brochures or filling of Technical Schedule. ---------- 0		**70**
	TOTAL		70

The Technical score will be carried forward to **STAGE 4**

STAGE 3 - FINANCIAL EVALUATION

The evaluation shall be in two sections
1. Preliminary examinations and
2. Tender sum Comparisons

A) PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:
a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.
Non compliance with the above shall lead to **automatic disqualification from further evaluation.**

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

B) TENDER SUMS COMPARISONS

In this section, tender sums will be compared to the average of all sums for bidders who have qualified from **STAGE 3A** and score awarded to a maximum score of 30 as shown below.

1 Preliminary Average

i. The tender sums of various binders, who qualify at **STAGE 3A** and the engineer's estimates, shall be reduced by omitting PC sums, provisional sums and contingency from the respectful amounts. The **average** of the adjusted tender sums so obtained shall be calculated.

ii. Any tenderer whose tender percentage deviation is 20% higher or lower than the average obtained above, will be deemed to be unreasonably high or low and shall not be included in determining the mean in table 3, However their bids will still be evaluated further. The Engineer's estimate will also be subjected to the same treatment.

2. Working mean

The detailed scoring plan shall be as shown in table 3 overleaf:

TABLE 3

Item	Description	Score	Max. score
I	Tender Sums: (The tender sums of binders, who qualify at STAGE 3A and the engineer's estimates, shall be reduced by omitting PC sums, provisional sums and contingency from the respectful amounts. The average of the adjusted tender sums so obtained shall be calculated. The deviation of the reduced amounts in respect of each bidder from the average shall then be worked out as a percentage of the average (Rounded off to one (1) decimal point) and scores allocated as follows :-) o Deviation of between 0% and 1% ---------- 30 o Deviation of between 1.1% and 2%---------- 28.5 o Deviation of between 2.1% and 3%---------- 27 o Deviation of between 3.1% and 4%---------- 25.5 o Deviation of between 4.1% and 5%---------- 24 o Deviation of between 5.1% and 6%---------- 22.5 o Deviation of between 6.1% and 7%---------- 21 o Deviation of between 7.1% and 8%---------- 19.5 o Deviation of between 8.1% and 9% ---------- 18 o Deviation of between 9.1% and 10%---------- 16.5 o Deviation of between 10.1% and 11%---------- 15 o Deviation of between 11.1% and 12%---------- 13.5 o Deviation of between 12.1% and 13%---------- 12 o Deviation of between 13.1% and 14%---------- 10.5 o Deviation of between 14.1% and 15%---------- 9 o Deviation of between 15.1% and 16%---------- 7.5 o Deviation of between 16.1% and 17% ---------- 6 o Deviation of between 17.1% and 18% ---------- 4.5 o Deviation of between 18.1% and 19%---------- 3 o Deviation of between 19.1% and 20%----------1.5 o Deviation of 20.1% and above---------- 0		30
	TOTAL		30

The Tender sum score will be carried forward to **STAGE 4**

STAGE 4 - <u>FINAL SCORE</u>

The total score will be combined sums of Technical, Tender Sums Comparison and Financial marks as below:

Technical (Ts) + Tender Sums Comparison (TSC) = Ts + TSC

<u>RECOMMENDATION</u>

The lowest responsive bidder who score 75% and above may be recommended for award.

SECTION B:

CONDITIONS OF CONTRACT (SUB CONTRACT WORKS)

CONDITIONS OF CONTRACT (SUB CONTRACT WORKS)

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CONDITIONS OF CONTRACT (SUB CONTRACT WORKS)

1. Definitions

1.1 In this Contract, except where context otherwise requires, the following terms shall be interpreted as indicated;

"Bills of Quantities" means the priced and completed Bill of Quantities forming part of the tender[where applicable].

"Schedule of Rates" means the priced Schedule of Rates forming part of the tender [where applicable].

"The Completion Date" means the date of completion of the Works as certified by the Employer's Representative.

"The Contract" means the agreement entered into by the Employer and the Contractor as recorded in the Agreement Form and signed by the parties.

"The Contractor" refers to the person or corporate body whose tender to carry out the Works has been accepted by the Employer.

"The Contractor's Tender" is the completed tendering document submitted by the Contractor to the Employer.

"The Contract Price" is the price stated in the Letter of Acceptance.

"Days" are calendar days; **"Months"** are calendar months.

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

"The Defects Liability Certificate" is the certificate issued by Employer's Representative upon correction of defects by the Contractor.

"The Defects Liability Period" is the period named in the Appendix to Conditions of Contract and calculated from the Completion Date.

"Drawings" include calculations and other information provided or approved by the Employer's Representative for the execution of the Contract.

"Employer" includes Central or Local Government administration, Universities, Public Institutions and Corporations and is the party who employs the Contractor to carry out the Works.

"Equipment" is the Contractor's machinery and vehicles brought temporarily to the Site for the execution of the Works.

"Site" means the place or places where the permanent Works are to be carried out including workshops where the same is being prepared.

"Materials" are all supplies, including consumables, used by the Contractor for incorporation in the Works.

"Employer's Representative" is the person appointed by the Employer and notified to the Contractor for the purpose of supervision of the Works.

"Specification" means the Specification of the Works included in the Contract.

"Start Date" is the date when the Contractor shall commence execution of the Works.

"A Sub-contractor" is a person or corporate body who has a Contract with the Contractor to carry out a part of the Work in the Contract, which includes Work on the Site.

"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's Representative which varies the Works.

"The Works" are what the Contract requires the Contractor to construct, install, and turnover to the Employer.

2. Contract Documents

2.1 The following documents shall constitute the Contract documents and shall be interpreted in the following order of priority;

(1) Agreement,
(2) Letter of Acceptance,
(3) Contractor's Tender,
(4) Conditions of Contract,
(5) Specifications,
(6) Drawings,
(7) Bills of Quantities or Schedule of Rates [whichever is applicable)

3. Employer's Representative's Decisions

3.1 Except where otherwise specifically stated, the Employer's Representative will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

4. Works, Language and Law of Contract

4.1 The Contractor shall construct and install the Works in accordance with the Contract documents. The Works may commence on the Start Date and shall be carried out in accordance with the Programme submitted by the Contractor, as updated with the approval of the Employer's Representative, and complete them by the Intended Completion Date.

4.2 The ruling language of the Contract shall be English language and the law governing the Contract shall be the law of the Republic of Kenya.

5. Safety, Temporary works and Discoveries

5.1 The Contractor shall be responsible for design of temporary works and shall obtain approval of third parties to the design of the temporary works where required.

5.2 The Contractor shall be responsible for the safety of all activities on the Site.

5.3 Any thing of historical or other interest or significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Employer's Representative of such discoveries and carry out the Employer's Representative's instructions for dealing with them.

6. Work Programme and Sub-contracting

6.1 Within seven days after Site possession date, the Contractor shall submit to the Employer's Representative for approval a programme showing the general methods, arrangements, order and timing for all the activities in the Works.

6.2 The Contractor may sub-contract the Works (but only to a maximum of 25 percent of the Contract Price) with the approval of the Employer's Representative. However, he shall not assign the Contract without the approval of the Employer in writing. Sub-contracting shall not alter the Contractor's obligations.

7. The site

7.1 The Employer shall give possession of all parts of the Site to the Contractor.

7.2 The Contractor shall allow the Employer's Representative and any other person authorised by the Employer's Representative, 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.

8. Instructions

8.1 The Contractor shall carry out all instructions of the Employer's Representative which are in accordance with the Contract.

9. Extension of Completion Date

9.1 The Employer's Representative shall extend the Completion Date if an occurrence arises which makes it impossible for completion to be achieved by the Intended Completion Date. The Employer's Representative shall decide whether and by how much to extend the Completion Date.

9.2 For the purposes of this Clause, the following occurrences shall be valid for consideration;

Delay by:-

(a) force majeure, or

(b) reason of any exceptionally adverse weather conditions, or

(c) reason of civil commotion, strike or lockout affecting any of the trades employed upon the Works or any of the trades engaged in the preparation, manufacture or transportation of any of the goods or materials required for the Works, or

(d) reason of the Employer's Representative's instructions issued under these Conditions, or

(e) reason of the contractor not having received in due time necessary instructions, drawings, details or levels from the Employer's Representative for which he specifically applied in writing on a date which having regard to the date for Completion stated in the appendix to these Conditions or to any extension of time then fixed under this Clause was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same, or

(f) delay on the part of artists, tradesmen or others engaged by the Employer in executing work not forming part of this Contract, or

(g) reason of delay by statutory or other services providers or similar bodies engaged directly by the Employer, or

(h) reason of opening up for inspection of any Work covered up or of the testing or any of the Work, materials or goods in accordance with these conditions unless the inspection or test showed that the Work, materials or goods were not in accordance with this Contract, or

(i) reason of delay in appointing a replacement Employer's Representative, or

(j) reason of delay caused by the late supply of goods or materials or in executing Work for which the Employer or his agents are contractually obliged to supply or to execute as the case may be, or

(k) Delay in receiving possession of or access to the Site.

10. Management Meetings

10.1 A Contract management meeting shall be held regularly and attended by the Employer's Representative and the Contractor. Its business shall be to review the plans for the remaining Work. The Employer's Representative shall record the business of management meetings and provide copies of the record to those attending the meeting and the Employer. The responsibility of the parties for actions to be taken shall be decided by the Employer's Representative either at the management meeting or after the management meeting and stated in writing to all who attend the meeting.

10.2 Communication between parties shall be effective only when in writing.

11. Defects

11.1 The Employer's Representative shall inspect the Contractor's work and notify the Contractor of any defects that are found. Such inspection shall not affect the Contractor's responsibilities. The Employer's Representative may instruct the Contractor to search for a defect and to uncover and test any Work that the Employer's Representative considers may have a defect. Should the defect be found, the cost of uncovering and making good shall be borne by the Contractor. However, if there is no defect found, the cost of uncovering and making good shall be treated as a variation and added to the Contract Price.

11.2 The Employer's Representative shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Appendix to Conditions of Contract.

11.3 Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified by the Employer's Representative's notice. If the Contractor has not corrected a defect within the time specified in the Employer's Representative's notice, the Employer's Representative will assess the cost of having the defect corrected by other parties and such cost shall be treated as a variation and be deducted from the Contract Price.

12. Bills of Quantities/Schedule of Rates

12.1 The Bills of Quantities/Schedule of Rates shall contain items for the construction, installation, testing and commissioning of the Work to be done by the Contractor. The Contractor will be paid for the quantity of the Work done at the rates in the Bills of Quantities/Schedule of Rates for each item. Items against which no rate is entered by the Tenderer will not be paid for when executed and shall be deemed covered by the rates for other items in the Bills of Quantities/Schedule of Rates.

12.2 Where Bills of Quantities do not form part of the Contract, the Contract Price shall be a lump sum (which shall be deemed to have been based on the rates in the Schedule of Rates forming part of the tender) and shall be subject to re-measurement after each stage.

13. Variations

13.1 The Contractor shall provide the Employer's Representative with a quotation for carrying out the variations when requested to do so. The Employer's Representative shall assess the quotation and shall obtain the necessary authority from the Employer before the variation is ordered.

13.2 If the Work in the variation corresponds with an item description in the Bill of Quantities/Schedule of Rates, the rate in the Bill of Quantities/Schedule of Rates shall be used to calculate the value of the variation. If the nature of the Work in the variation does not correspond with items in the Bill of Quantities/Schedule of Rates, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.

13.3 If the Contractor's quotation is unreasonable, the Employer's Representative may order the variation and make a change to the Contract Price, which shall be based on the Employer's Representative's own forecast of the effects of the variation on the Contractor's costs.

14. Payment Certificates and Final Account

14.1 The Contractor shall be paid after each of the following stages of Work listed herebelow (subject to re-measurement by the Employer's Representative of the Work done in each stage before payment is made). In case of lump-sum Contracts, the valuation for each stage shall be based on the quantities so obtained in the re-measurement and the rates in the Schedule of Rates.

(i) Advance payment [after Contract execution] **NIL** (*percent of Contract Price, to be inserted by the Employer).*

(ii) First stage (*define stage)* ***AS PER PROGRESS***

(iii) Second stage *(define stage*) ***AS PER PROGRESS***

(iv) Third stage (*define stage)* ***AS PER PROGRESS***

(v) After defects liability period.

14.2 Upon deciding that Works included in a particular stage are complete, the Contractor shall submit to the Employer's Representative his application for payment. The Employer's Representative shall check, adjust if necessary and certify the amount to be paid to the Contractor within 21 days of receipt of the Contractor's application .The Employer shall pay the Contractor the amounts so certified within 30 days of the date of issue of each Interim Certificate.

14.3 The Contractor shall supply the Employer's Representative with a detailed final account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer's Representative shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer's Representative shall issue within 21 days a schedule that states the scope of the corrections or additions that are necessary. If the final account is still unsatisfactory after it has been resubmitted, the Employer's Representative shall decide on the amount payable to the Contractor and issue a Final Payment Certificate. The Employer shall pay the Contractor the amount so certified within 60 days of the issue of the Final Payment Certificate.

14.4 If the period laid down for payment to the Contractor upon each of the Employer's Representative's Certificate by the Employer has been exceeded, the Contractor shall be entitled to claim simple interest calculated pro-rata on the basis of the number of days delayed at the

Central Bank of Kenya's average base lending rate prevailing on the first day the payment becomes overdue. The Contractor will be required to notify the Employer within 15 days of receipt of delayed payments of his intentions to claim interest.

15. Insurance

15.1 The Contractor shall be responsible for and shall take out appropriate cover against, among other risks, personal injury; loss of or damage to the Works, materials and plant; and loss of or damage to property.

16. Liquidated Damages

16.1 The Contractor shall pay liquidated damages to the Employer at the rate 0.001 per cent of the Contract price per day for each day that the actual Completion Date is later than the Intended Completion Date except in the case of any of the occurrences listed under Clause 9.2. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

17. Completion and Taking Over

17.1 Upon deciding that the Work is complete the Contractor shall request the Employer's Representative to issue a Certificate of Completion of the Works, upon deciding that the Work is completed.

The Employer shall take over the Site and the Works within seven days of the Employer's Representative issuing a Certificate of Completion.

18. Termination

18.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. These fundamental breaches of Contract shall include, but shall not be limited to, the following;

(a) the Contractor stops Work for 30 days continuously without reasonable cause or authority from the Employer's Representative;

(b) the Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(c) a payment certified by the Employer's Representative is not paid by the Employer to the Contractor within 30 days after the expiry of the payment periods stated in Sub-Clauses 14.2 and 14.3 here above.

(d) the Employer's Representative gives notice that failure to correct a particular defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time.

18.2 If the Contract is terminated, the Contractor shall stop Work immediately, and leave the Site as soon as reasonably possible. The Employer's Representative shall immediately thereafter arrange for a meeting for the purpose of taking record of the Works executed and materials, goods, equipment and temporary buildings on Site.

19. Payment Upon Termination

19.1 The Employer may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on Site, plant, equipment and temporary works.

19.2 The Contractor shall, during the execution or after the completion of the Works under this Clause, remove from the Site as and when required within such reasonable time as the Employer's Representative may in writing specify, any temporary buildings, plant,
machinery, appliances, goods or materials belonging to him, and in default thereof , the Employer may (without being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor.

19.3 Until after completion of the Works under this Clause, the Employer shall not be bound by any other provision of this Contract to make any payment to the Contractor, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefor the Employer's Representative shall certify the amount of expenses properly incurred by the Employer and, if such amount added to the money paid to the Contractor before such determination exceeds the total amount which would have been payable on due completion in accordance with this Contract, the difference shall be a debt payable to the Employer by the Contractor; and if the said amount added to the said money be less than the said total amount, the difference shall be a debt payable by the Employer to the Contractor.

20. Corrupt Gifts and Payments of Commission

20.1 The Contractor shall not:

(a) Offer or give or agree to give to any person in the service of the Employer any gifts or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract with the Employer or for showing or forbearing to show favour or disfavour to any person in relation to this or any other contract with the Employer.

(b) Any breach of this Condition by the Contractor or by anyone employed by him or acting on his behalf (whether with or without the knowledge of the Contractor) shall be an offence under the Laws of Kenya.

21. Settlement of Disputes

21.1 Any dispute arising out of the Contract which cannot be amicably settled between the parties shall be referred by either party to the arbitration and final decision of a person to be agreed between the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointed by the chairman of the Chartered Institute of Arbitrators, Kenya branch, on the request of the applying party.

APPENDIX TO CONDITIONS OF CONTRACT

THE EMPLOYER IS

The County Government of Meru
Represented by:
Chief Officer, Health
County Government of Meru
P.O. Box 120-60200
Meru.

Name of Employer's Representative:
Works Secretary,
State Department of Publics works in the Ministry of Transport, Infrastructure, Housing & Urban Development
Address: **P.O. Box 30743 - 00100, NAIROBI**
Info:info@publicworks.go.ke
The name (and identification number) of the contract is **the Proposed Erection and Completion of a Ward Block at Meru County Level 5 Hospital (Phase 1), Meru County.**

W.P ITEM NO.D108/EN/MRU 1601 -JOB NO.0397F

The Works consist of **Supply, Delivery, Installation, Testing and Commission of medical gas pipeline and equipment installation Works**

The Start date shall be **as agreed with the project manager**

The Intended contract period for the whole of the Works shall be **120 weeks from the date of commencement**

The following documents also form part of the Contract: **(Only as listed in Clause 2)**

The Site Possession Date shall be **as stated in the letter of acceptance**.

The Sites is **located in Meru County**

The Defects Liability Period is **180 days**

Amount of Tender Security is **Kshs. 200,000**

The name and Address of the Employer's representative for the purposes of submission of tenders is **Works Secretary,** Ministry of Transport, Infrastructure, Housing & Urban Development, **P.O. Box 30743-30100, Nairobi.**

The tender opening date and time is **as stated in the invitation to tender.**

The amount of performance security is **5 percent** bank guarantee of the Contract Price.

Period of final measurement	:	**3 months from practical completion**
Liquidated and Ascertained damages:		**At the rate of Kshs. 50,000.00 per week or part thereof**
Prime cost sums for which the Contractor desires to tender	:	**Nil**
Period of honouring certificate:		**45 days**
Percentage of certified value retained:		**10%**
Limit of retention fund		**5%**

SECTION C

SUB-CONTRACT PRELIMINARIES

AND

GENERAL CONDITIONS

CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

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SECTION C

SUB-CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

Examination of Tender Documents

The tenderer is required to check the number of pages of this document and should he find any missing or indistinct, he must inform the Engineer at once and have the same rectified.

All tenderers shall be deemed to have carefully examined the following:

Work detailed in the Specification and in the Contract Drawings.

The Republic of Kenya Document "General Conditions of Contract for Electrical and Mechanical Works".

Other documents to which reference is made.

He shall also be deemed to have included for any expenditure which may be incurred in conforming with the above items (a), (b), (c) and observe this expense as being attached to the contract placed for the whole or any part of the work.

The tenderer shall ensure that all ambiguities, doubts or obscure points of detail, are clarified with the Engineer before submission of his tender, as no claims for alleged deficiencies in the information given shall be considered after this date.

Discrepancies

The Contractor shall include all work either shown on the Contract Drawings or detailed in the specification. No claim or extra cost shall be considered for works which has been shown on the drawings or in the specification alone.

Should the drawing and the specification appear to conflict, the Sub-contractor shall query the points at the time of tendering and satisfy himself that he has included for the work intended, as no claim for extra payment on this account shall be considered after the contract is awarded.

Conditions of Contract Agreement

The Contractor shall be required to enter into a Sub-contract with the Main Contractor.

The Conditions of the Contract between the Main Contractor and any Sub-contractor as hereinafter defined shall be the latest edition of the Agreement and Schedule of Conditions of Kenya Association of Building and Civil Engineering Contractors as particularly modified and amended hereinafter.

For the purpose of this contract the Agreement and Schedule of Conditions and any such modifications and amendments shall read and construed together. In any event of discrepancy the modifications and amendments shall prevail.

1.04 Payment

Payment will be made through certificates to the Main Contractor, All payments will be less retention as specified in the Main Contract. No payment will become due until materials are delivered to site.

1.05 Definition of Terms

Throughout these contract documents units of measurements, terms and expressions are abbreviated and wherever used hereinafter and in all other documents they shall be interpreted as follows:

i) **Employer:** The term **"Employer"** shall mean **The Government of The Republic of Kenya Represented by: The chancellor, Moi University**

ii) **Architect:** The term **"Architect"** shall mean **The Chief Architect, Ministry of Transport, Infrastructure, Housing & Urban Development**

iii) **Quantity Surveyor**: The term **"Quantity Surveyor"** shall mean **The Chief Quantity Surveyor, Ministry of Transport, Infrastructure, Housing & Urban Development**

iv) **Civil/Structural Engineers**: The term **"Civil/Structural Engineers"** shall mean **The Chief Engineer (Structural), Ministry of Transport, Infrastructure, Housing & Urban Development**

v) **Engineer**: The term **"Engineer"** shall mean **Chief Engineer Mechanical (BS), Ministry of Transport, Infrastructure, Housing & Urban Development**

vi) **Main Contractor:** The term **"Main Contractor"** shall mean the firm or company appointed to carry out the Building Works and shall include his or their heir, executors, assigns, administrators, successors, and duly appointed representatives.

Sub-contractor: The term **"Sub-contractor"** shall mean the persons or person, firm or Company whose tender for this work has been accepted, and who has entered into a contract agreement with the Contractor for the execution of the Sub-contract Works, and shall include his or their heirs, executors, administrators, assigns, successors and duly appointed representatives.

viii) **Sub-contract Works:** The term **"Sub-contract Works"** shall mean all or any portion of the work, materials and articles, whether the same are being manufactured or prepared, which are to be used in the execution of this Sub-contract and whether the same may be on site or not.

Contract Drawings: The term **"Contract Drawings"** shall mean those drawings required or referred to herein and forming part of the Bills of Quantities.

Working Drawings: The term **"Working Drawings"** shall mean those drawings required to be prepared by the Sub-contractor as hereinafter described.

xi) **Record Drawings:** The term **"Record Drawings"** shall mean those drawings required to be prepared by the Sub-contractor showing "as installed" and other records for the Sub-contract Works.

xii) **Abbreviations:**

CM shall mean **Cubic Metre**
SM shall mean **Square Metre**
LM shall mean **Linear Metre**
LS shall mean **Lump Sum**
mm shall mean **Millimetres**
No. Shall mean **Number**
Kg. shall mean **Kilogramme**
KEBS or KS shall mean **Kenya Bureau of Standards**
BS shall mean. **Current standard British Standard Specification published by the British Standard Institution, 2 Park Street, London W1, England**

"Ditto" shall mean the whole of the preceding description in which it occurs. Where it occurs in description of succeeding item it shall mean the same as in the first description of the series in which it occurs except as qualified in the description concerned. Where it occurs in brackets it shall mean the whole of the preceding description which is contained within the appropriate brackets.

1.06 **Site Location**

The site of the Contract Works is situated at **Meru County**.
The tenderer is recommended to visit the site and shall be deemed to have satisfied himself with regard to access, possible conditions, the risk of injury or damage to property on/or adjacent to the site, and the conditions under which the sub-contract Works shall have to be carried out and no claims for extras will be considered on account of lack of knowledge in this respect.

1.07 **Duration of Sub-Contract**

The Contractor shall be required to phase his work in accordance with the Main contractor's programme (or its revision).

1.08 **Scope of Contract Works**

The contractor shall supply, deliver, unload, hoist, fix, test, commission and hand-over in satisfactory working order the complete installations specified hereinafter and/or as shown on the Contract Drawings attached hereto, including the provision of labour, transport and plant for unloading material and storage, and handling into position and fixing, also the supply of ladders, scaffolding the other mechanical devices to plant, installation, painting, testing, setting to work, the removal from site from time to time of all superfluous material and rubbish caused by the works.

The contractor shall supply all accessories, whether of items or equipment supplied by the Sub-Contractor but to be fixed and commissioned under this contract.

1.09 **Extent of the Sub-contractor's Duties**

At the commencement of the works, the contractor shall investigate and report to the Engineer if all materials and equipment to be used in the work and not specified as supplied by the others are available locally. If these materials and equipment are not available locally, the contractor shall at this stage place orders for the materials in question and copy the orders to the Engineer. Failure to do so shall in no way relieve the contractor from supplying the specified materials and equipment in time.

Materials supplied by others for installation and/or connection by the Contractor shall be carefully examined in the presence of the supplier Before installation and connection. Any defects noted shall immediately be Reported to the Engineer.

The contractor shall be responsible for verifying all dimensions relative to his work by actual measurements taken on site.

The Contractor shall mark accurately on one set of drawings and Indicate all alterations and/or modifications carried out to the designed System during the construction period. This information must be made available on site for inspection by the Engineer.

1.10 **Execution of the Works**

The works shall be carried out strictly in accordance with:

a) All relevant Kenya Bureau of Standards Specifications.

b) All relevant British Standard Specifications and Codes Of Practice (hereinafter referred to B.S. and C.P. respectively).

c) General specifications of materials and works Section D of this document

d) The Contract Drawings.

e) The Bye-laws of the Local Authority.

f) The Architect's and/or Engineer's Instructions.

The Contract Drawings and Specifications are to be read and construed together.

1.11 **Validity of Tender**

The tender shall remain valid for acceptance within 120 days from the final date of submission of the tender, and this has to be confirmed by signing the Tender Bond. The tenderer shall be exempted from this Bond if the tender was previously withdrawn in writing to the Employer before the official opening.

1.12 **Firm – Price Contract**

Unless specifically stated in the documents or the invitation to tender, this is a firm-price Contract and the contractor must allow in his tender for the increase in the cost of labour and/or materials during the duration of the contract. No claims will be allowed for increased costs arising from the fluctuations in duties and/or day to day currency fluctuations. The Sub-contractor will be deemed to have allowed in his tender for any increase in the cost of materials, which may arise as a result of currency fluctuation during the contract period.

1.13 **Variation**

No alteration to the Contract Works shall be carried out until receipt by the Contractor of written instructions from the Project Manager.

Any variation from the contract price in respect of any extra work, alteration or omission requested or sanctioned by the Engineer shall be agreed and confirmed in writing at the same time such variations are decided and shall not affect the validity of the Contract. Schedule of Unit Rates shall be used to assess the value of such variations. No allowance shall be made for loss of profit on omitted works.

Where the Architect requires additional work to be performed, the Sub-contractor, if he considers it necessary, will give notice within seven (7) days to the Main Contractor of the length of time he (the Sub-contractor) requires over and above that allotted for completion of the Contract.

If the Sub-contractor fails to give such notice he will be deemed responsible for the claims arising from the delay occasioned by reason of such extension of time.

1.14 **Prime Cost and Provisional Sums**

A specialist Sub-contractor may be nominated by the Project Manager to supply and/or install any equipment covered by the Prime Cost or Provisional Sums contained within the Contract documents.

The work covered by Prime Cost and Provisional Sums may or may not be carried out at the discretion of the Project Manager.

The whole or any part of these sums utilised by the Contractor shall be deducted from the value of the Contract price when calculating the final account.

1.15 **Bond**

The tenderer must submit with his tender the name of one Surety who must be an established Bank only who will be willing to be bound to the Government for an amount equal to 7½ % of the Contract amount as Clause 28 of the Conditions of Contract.

1.16 **Government Legislation and Regulations**

The Contractor's attention is called to the provision of the Factory Act 1972 and subsequent amendments and revisions, and allowance must be made in his tender for compliance therewith, in so far as they are applicable.

The Contractor must also make himself acquainted with current legislation and any Government regulations regarding the movement, housing, security and control of labour, labour camps, passes for transport, etc.

The Contractor shall allow for providing holidays and transport for work people, and for complying with Legislation, Regulations and Union Agreements.

1.17 **Import Duty and Value Added Tax**

The Sub-contractor will be required to pay full Import Duty and Value Added Tax on all items of equipment, fittings and plant, whether imported or locally manufactured. The tenderer shall make full allowance in his tender for all such taxes.

1.18 **Insurance Company Fees**

Attention is drawn to the tenderers to allow for all necessary fees, where known, that may be payable in respect of any fees imposed by Insurance Companies or statutory authorities for testing or inspection.

No allowance shall be made to the contractor with respect to fees should these have been omitted by the tenderer due to his negligence in this respect.

1.19 **Provision of Services by the Main Contractor**

In accordance with Clause 1.08 of this Specification the Contractor shall make the following facilities available to the Sub-contractor:

a) Attendance on the Sub-Contractor and the carrying out of all work affecting the structure of the building which may be necessary, including all chasing, cutting away and making good brickwork, etc., except that all plugging for fixing, fittings, machinery, fan ducting, etc., and all drilling and tapping of steel work shall be the responsibility of the Sub-contractor. Any purpose made fixing brackets shall not constitute Builder's Work and shall be provided and installed by the Sub-contractor unless stated hereinafter otherwise.

b) The provision of temporary water, lighting and power: the Contractor pay for all these services utilized.

c) Fixing of anchorage and pipe supports in the shuttering, shall be supplied by the Contractor who shall also supply the Project Manager with fully dimensioned drawings detailing the exact locations.

d) i)Provision of scaffolding, cranes, etc. It shall be the Contractor's responsibility to liaise with the Project Manager to ensure that there is maximum co-operation with other nominated Sub-contractors in the use of scaffolding, cranes, etc.

ii)Any specialist scaffolding, cranes, etc. by the Contractor for his own exclusive use shall be paid for by the Sub-contractor.

1.20 **Suppliers**

The Contractor shall submit names of any supplier for the materials to be incorporated, to the Engineer for approval. The information regarding the names of the suppliers may be submitted at different times, as may be convenient, but no sources of supply will be changed without prior approval. Each supplier must be willing to admit the Engineer or his representative to his premises during working hours for the purpose of examining or obtaining samples of the materials in question.

1.21 **Samples and Materials Generally**

The Contractor shall, when required, provide for approval at no extra cost, samples of all materials to be incorporated in the works. Such samples, when approved, shall be retained by the Engineer and shall form the standard for all such materials incorporated.

1.22 **Administrative Procedure and Contractual Responsibility**

Wherever within the Specification it is mentioned or implied that the Contractor shall deal direct with the Employer or Engineer, it shall mean "through the Project Manager who is responsible to the Employer for the whole of the works including the Sub-contract Works.

1.23 **Bills of Quantities**

The Bills of Quantities have been prepared in accordance with the standard method of measurement of Building Works for East Africa, first Edition, Metric, 1970. All the Quantities are based on the Contract Drawings and are provisional and they shall not be held to gauge or to limit the amount or description of the work to be executed by the Contractor but the value thereof shall be deducted from the Contract Sum and the value of the work ordered by the Engineer and executed thereunder shall be measured and valued by the Engineer in accordance with the conditions of the Contract.

All work liable to adjustment under this Contract shall be left uncovered for a reasonable time to allow measurements needed for such adjustment to be taken by the Quantity Surveyor or Engineer. Immediately the work is ready for measuring the Contractor shall give notice to the Quantity Surveyor or Engineer to carry out measurements before covering up. If the Contractor shall make default in these respects he shall, if the Engineer so directs, uncover the work to enable the necessary measurements to be taken and afterwards reinstate at his own expense.

1.24 **Contractor's Office in Kenya**

The Contractor shall maintain (after first establishing if necessary) in Kenya an office staffed with competent Engineer Manager and such supporting technical and clerical staff as necessary to control and coordinate the execution and completion of the Contract Works.

The Engineer Manager and his staff shall be empowered by the Contractor to represent him at meetings and in discussions with the Project Manager, the Engineer and other parties who may be concerned and any liaison with the Contractor's Head Office on matters relating to the design, execution and completion of the Contract Works shall be effected through his office in Kenya.

It shall be the Contractor's responsibility to procure work permits, entry permits, licences, registration, etc., in respect of all expatriate staff.

The Contractor shall prepare a substantial proportion of his Working Drawings at his office in Kenya. No reasons for delays in the preparation or submission for approval or otherwise of such drawings or proposals will be accepted on the grounds that the Sub-contractor's Head Office is remote from his office in Nairobi or the site of the Contract Works or otherwise.

1.25 **Builder's Work**

All chasing, cutting away and making good will be done by the Contractor. The Contractor shall mark out in advance and shall be responsible for accuracy of the size and position of all holes and chases required.

The Contractor shall drill and plug holes in floors, walls, ceiling and roof for securing services and equipment requiring screw or bolt fixings.

Any purpose made fixing brackets shall be provided and installed by the Contractor.

1.26 **Structural Provision for the Works**

Preliminary major structural provision has been made for the Contract Works based on outline information ascertained during the preparation of the Specification.

The preliminary major structural provision made will be deemed as adequate unless the Contractor stated otherwise when submitting his tender.

Any major structural provision or alteration to major structural provisions required by the Contractor shall be shown on Working Drawings to be submitted to the Engineer within 30 days of being appointed.

No requests for alterations to preliminary major structural provisions will be approved except where they are considered unavoidable by the Engineer. In no case will they be approved if building work is so far advanced as to cause additional costs or delays in the works.

1.27 **Position of Services, Plant, Equipment, Fittings and Apparatus**

The Contract Drawings give a general indication of the intended layout. The position of the equipment and apparatus, and also the exact routes of the ducts, main and distribution pipework shall be confirmed before installation is commenced. The exact sitting of appliances, pipework, etc., may vary from that indicated.

The routes of services and positions of apparatus shall be determined by the approved dimensions detailed in the Working Drawings or on site by the Engineer in consultation with the Contractor.

Services through the ducts shall be arranged to allow maximum access along the ducts and the services shall be readily accessible for maintenance. Any work, which has to be re-done due to negligence in this respect shall be the Sub-contractor's responsibility.

The Sub-contractor shall be deemed to have allowed in his Contract Sum for locating terminal points of services (e.g. lighting, switches, socket outlets, lighting points, control switches, thermostats and other initiating devices, taps, stop cocks) in positions plus or minus 1.2m horizontally and vertically from the locations shown on Contract Drawings. Within these limits no variations in the Contract Sum will be made unless the work has already been executed in accordance with previously approved Working Drawings and with the approval of the Engineer.

1.28 **Checking of Work**

The Contractor shall satisfy himself to the correctness of the connections he makes to all items of equipment supplied under the Contract agreement and equipment supplied under other contracts before it is put into operation. Details of operation, working pressures, temperatures, voltages, phases, power rating, etc., shall be confirmed to others and confirmation received before the system is first operated.

1.29 **Setting to Work and Regulating System**

The Contractor shall carry out such tests of the Contract Works as required by British Standard Specifications, or equal and approved codes as specified hereinafter and as customary.

No testing or commissioning shall be undertaken except in the presence of and to the satisfaction of the Engineer unless otherwise stated by him (Contractor's own preliminary and proving tests excepted).

It will be deemed that the Contractor has included in the Contract Sum for the costs of all fuel, power, water and the like, for testing and commissioning as required as part of the Contract Works. He shall submit for approval to the Engineer a suitable programme for testing and commissioning. The Engineer and Employer shall be given ample warning in writing, as to the date on which testing and commissioning will take place.

The Contractor shall commission the Contract Works and provide attendance during the commissioning of all services, plant and apparatus connected under the Contract Agreement or other Sub-contract Agreements, related to the project.

Each system shall be properly balanced, graded and regulated to ensure that correct distribution is achieved and where existing installations are affected, the Contractor shall also regulate these systems to ensure that their performance is maintained.

The proving of any system of plant or equipment as to compliance with the Specification shall not be approved by the Engineer, except at his discretion, until tests have been carried out under operating conditions pertaining to the most onerous conditions specified except where the time taken to obtain such conditions is unreasonable or exceeds 12 months after practical completion of the Contract Works.

1.30 **Identification of Plant Components**

The Contractor shall supply and fix identification labels to all plant, starters, switches and items of control equipment including valves, with white traffolyte or equal labels engraved in red lettering denoting its name, function and section controlled. The labels shall be mounted on equipment and in the most convenient positions. Care shall be taken to ensure the labels can be read without difficulty. This requirement shall apply also to major components of items of control equipment.

Details of the lettering of the labels and the method of mounting or supporting shall be forwarded to the Engineer for approval prior to manufacture.

1.31 **Contract Drawings**

The Contract Drawings when read in conjunction with the text of the Specification, have been completed in such detail as was considered necessary to enable competitive tenders to be obtained for the execution and completion of the Contract works.

The Contract Drawings are not intended to be Working Drawings and shall not be used unless exceptionally they are released for this purpose.

1.32 **Working Drawings**

The Contractor shall prepare such Working Drawings as may be necessary. The Working Drawings shall be complete in such detail not only that the Contract Works can be executed on site but also that the Engineer can approve the Contractor's proposals, detailed designs and intentions in the execution of the Contract Works.

If the Contractor requires any further instructions, details, Contract Drawings or information drawings to enable him to prepare his Working Drawings or proposals, the Contractor shall accept at his own cost, the risk that any work, commenced or which he intends to commence at site may be rejected.

The Engineer, in giving his approval to the Working Drawings, will presume that any necessary action has been, or shall be taken by the Contractor to ensure that the installations shown on the Working Drawings have been cleared with the Project Manager and any other Sub-contractors whose installations and works might be affected.

If the Contractor submits his Working Drawings to the Engineer without first liaising and obtaining clearance for his installations from the Project Manager and other Sub-contractors whose installations and works might be affected, then he shall be liable to pay for any alterations or modification to his own, or other Sub-contractor's installations and works, which are incurred, notwithstanding any technical or other approval received from the Engineer.

Working Drawings to be prepared by the Contractor shall include but not be restricted to the following:

Any drawings required by the Engineer to enable structural provisions to be made including Builder's Working Drawings or Schedules and those for the detailing of holes, fixings, foundations, cables and paperwork ducting below or above ground or in or outside or below buildings.

General Arrangement Drawings of all plant, control boards, fittings and apparatus or any part thereof and of installation layout arrangement of such plant and apparatus.

Schematic Layout Drawings of services and of control equipment.

Layout Drawings of all embedded and non-embedded paperwork, ducts and electrical conduits.

Complete circuit drawings of the equipment, together with associated circuit description.

Such other drawings as are called for in the text of the Specification or Schedules or as the Engineer may reasonably require.

Three copies of all Working Drawings shall be submitted to the Engineer for approval. One copy of the Working Drawings submitted to the Engineer for approval shall be returned to the Contractor indicating approval or amendment therein.

Six copies of the approved Working Drawings shall be given to the Project Manager by the Sub-contractor for information and distribution to other Sub-contractors carrying out work associated with or in close proximity to or which might be affected by the Sub-contract Works.

Approved Working Drawings shall not be departed from except as may be approved or directed by the Engineer.

Approval by the Engineer of Working Drawings shall neither relieve the Contractor of any of his obligations under the Sub-contract nor relieve him from correcting any errors found subsequently in the Approved Working Drawings or other Working Drawings and in the Sub-contract Works on site or elsewhere associated therewith.
The Contractor shall ensure that the Working Drawings are submitted to the Engineer for approval at a time not unreasonably close to the date when such approval is required. Late submission of his Working Drawings will not relieve the Contractor of his obligation to complete the Contract Works within the agreed Contract Period and in a manner that would receive the approval of the Engineer.

1.33 **Record Drawings (As Installed) and Instructions**

During the execution of the Contract Works the Contractor shall, in a manner approved by the Engineer record on Working or other Drawings at site all information necessary for preparing Record Drawings of the installed Contract Works. Marked-up Working or other Drawings and other documents shall be made available to the Engineer as he may require for inspection and checking.

Record Drawings, may, subject to the approval of the Engineer, include approved Working Drawings adjusted as necessary and certified by the Contractor as a correct record of the installation of the Contract Works.

They shall include but not restricted to the following drawings or information: Working Drawings amended as necessary but titled "Record Drawings" and certified as a true record of the "As Installed" Sub-contract Works. Subject to the approval of the Engineer such Working Drawings as may be inappropriate may be omitted.

Fully dimensioned drawings of all plant and apparatus.

General arrangement drawings of equipment, other areas containing plant forming part of the Contract Works and the like, indicating the accurate size and location of the plant and apparatus suitability cross-referenced to the drawings mentioned in (b) above and hereinafter.

Routes, types, sizes and arrangement of all pipework and ductwork including dates of installation of underground pipework.

Relay adjustment charts and manuals.

Routes, types, sizes and arrangement of all electric cables, conduits, ducts and wiring including the dates of installation of buried works.
System schematic and trunking diagrams showing all salient information relating to control and instrumentation.
Grading Charts.
Valve schedules and locations suitability cross-referenced.

Wiring and piping diagrams of plant and apparatus.
Schematic diagrams of individual plant, apparatus and switch and control boards. These diagrams to include those peculiar to individual plant or apparatus and also those applicable to system operation as a whole.

Operating Instruction
Schematic and wiring diagrams shall not be manufacturer's multipurpose general issue drawings. They shall be prepared specially for the Contract Works and shall contain no spurious or irrelevant information.

Marked-up drawings of the installation of the Contract Works shall be kept to date and completed by the date of practical or section completion. Two copies of the Record Drawings of Contract Works and two sets of the relay adjustment and grading charts and schematic diagrams on stiff backing shall be provided not later than one month later.

The Contractor shall supply for fixing in sub-stations, switch-rooms, boiler houses, plant rooms, pump houses, the office of the Maintenance Engineer and other places, suitable valve and instructions charts, schematic diagrams of instrumentation and of the electrical reticulation as may be requested by the Engineer providing that the charts, diagrams, etc., relate to installations forming part of the Contract Works. All such charts and diagrams shall be of suitable plastic material on a stiff backing and must be approved by the Engineer before final printing.

Notwithstanding the Contractor's obligations referred to above, if the Contractor fails to produce to the Engineer's approval, either:-

The Marked-up Drawings during the execution of the Contract Works or

The Record Drawings, etc., within one month of the Section or Practical Completion

The Engineer shall have these drawings produced by others. The cost of obtaining the necessary information and preparing such drawings, etc., will be recovered from the Contractor.

1.34 **Maintenance Manual**

Upon Practical Completion of the Contract Works, the Contractor shall furnish the Engineer four copies of a Maintenance Manual relating to the installation forming part of all of the Contract Works.

The manual shall be loose-leaf type, International A4 size with stiff covers and cloth bound. It may be in several volumes and shall be sub-divided into sections, each section covering one Engineering service system. It shall have a ready means of reference and a detailed index.

There shall be a separate volume dealing with Air Conditioning and Mechanical Ventilation installation where such installations are included in the Contract Works.

The manual shall contain full operating and maintenance instructions for each item of equipment, plant and apparatus set out in a form dealing systematically with each system. It shall include as may be applicable to the Contract Works the following and any other items listed in the text of the Specifications:
System Description.

Plant

Valve Operation

Switch Operation

Procedure of Fault Finding

Emergency Procedures

Lubrication Requirements

Maintenance and Servicing Periods and Procedures

Colour Coding Legend for all Services

Schematic and Writing Diagrams of Plant and Apparatus

Record Drawings, true to scale, folded to International A4 size

Lists of Primary and Secondary Spares.

The manual is to be specially prepared for the Contract Works and manufacturer's standard descriptive literature and plant operating instruction cards will not be accepted for inclusion unless exceptionally approved by the Engineer. The Contractor shall, however, affix such cards, if suitable, adjacent to plant and apparatus. One spare set of all such cards shall be furnished to the Engineer.

1.35 **Hand-over**

The Contract Works shall be considered complete and the Maintenance and Defects Liability Period shall commence only when the Contract Works and supporting services have been tested, commissioned and operated to the satisfaction of the Engineer and officially approved and accepted by the Employer.

The procedure to be followed will be as follows:

On the completion of the Contract Works to the satisfaction of the Engineer and the Employer, the Contractor shall request the Engineer, at site to arrange for handing over.

The Engineer shall arrange a Hand-over Meeting or a series thereof, at site.

The Contractor shall arrange with the Engineer and Employer for a complete demonstration of each and every service to be carried out and for instruction to be given to the relevant operation staff and other representatives of the Employer.

In the presence of the Employer and the Engineer, Hand-over will take place, subject to Agreement of the Hand-over Certificates and associated check lists.

1.36 **Painting**

It will be deemed that the Contractor allowed for all protective and finish painting in the Contract Sum for the Contract Works, including colour coding of service pipework to the approval of the Engineer. Any special requirements are described in the text of the Specifications.

1.37 **Spares**

The Contractor shall supply and deliver such spares suitably protected and boxed to the Engineer's approval as are called for in the Specifications or in the Price Schedules.

1.38 **Testing and Inspection – Manufactured Plant**

The Engineer reserves the right to inspect and test or witness of all manufactured plant equipment and materials.

The right of the Engineer relating to the inspection, examination and testing of plant during manufacture shall be applicable to Insurance companies and inspection authorities so nominated by the Engineer.

The Contractor shall give two week's notice to the Engineer of his intention to carry out any inspection or tests and the Engineer or his representative shall be entitled to witness such tests and inspections.

Six copies of all test certificates and performance curves shall be submitted as soon as possible after the completion of such tests, to the Engineer for his approval.

Plant or equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Contractor's own risk and should the test certificate not be approved new tests may be ordered by the Engineer at the Contractor's expense.

The foregoing provisions relate to tests at manufacturer's works and as appropriate to those carried out at site.

1.39 **Testing and Inspection -Installation**

Allow for testing each section of the Contract Works installation as described hereinafter to the satisfaction of the Engineer.

1.40 **Labour Camps**

The Contractor shall provide the necessary temporary workshop and mess-room in position to be approved by the Architect.

The work people employed by the Contractor shall occupy or be about only that part of the site necessary for the performance of the work and the Contractor shall instruct his employees accordingly.

If practicable, W.C. accommodation shall be allocated for the sole use of the Contractor's workmen and the Sub-contractor will be required to keep the same clean and disinfected, to make good any damage thereto and leave in good condition.

1.41 **Storage of Materials**

The Contractor shall provide storerooms and workshop where required. He shall also provide space for storage to nominated sub-contractors who shall be responsible for these lock-up shades or stores provided.

Nominated Sub-contractors are to be made liable for the cost of any storage accommodation provided specially for their use. No materials shall be stored or stacked on suspended slabs without the prior approval of the Project manager.

1.42 **Initial Maintenance**

The Contractor shall make routine maintenance once a month during the liability for the Defects Period and shall carry out all necessary adjustments and repairs, cleaning and oiling of moving parts. A monthly report of the inspection and any works done upon the installation shall be supplied to the Engineer.

The Contractor shall also provide a 24 -hour break-down service to attend to faults on or malfunctioning of the installation between the routine visits of inspection.

The Contractor shall allow in the contract Sum of the initial maintenance, inspection and break-down service and shall provide for all tools, instruments, plant and scaffolding and the transportation thereof, as required for the correct and full execution of these obligations and the provision, use or installation of all materials as oils, greases, sandpaper, etc., or parts which are periodically renewed such as brake linings etc., or parts which are faulty for any reason whatsoever excepting always Acts of God such as storm, tempest, flood, earthquake and civil revolt, acts of war and vandalism.

1.43 **Maintenance and Servicing After Completion of the Initial Maintenance**

The Contractor shall, if required, enter into a maintenance and service agreement with the employer for the installation for a period of up to five years from the day following the last day of the liability for Defects Period which offers the same facilities as specified in Clause 1.41 (Initial Maintenance).

The terms of any such agreement shall not be less beneficial to the employer than the terms of Agreements for either similar installation.

The Contractor shall submit with his tender for the works, where called upon a firm quotation for the maintenance and service of the installation as specified herein, which shall be based upon the present day costs and may be varied only to take into account increases in material and labour unit rate costs between the time of tendering and the signing of the formal maintenance and service agreement and which shall remain valid and open for acceptance by the Employer to and including the last day of the fifth complete calendar month following the end of the liability for Defects Period.

1.44 **Trade Names**

Where trade names of manufacturer's catalogue numbers are mentioned in the Specification or the Bills of Quantities, the reference is intended as a guide to the type of article or quality of material required. Alternate brands of equal and approved quality will be acceptable.

1.45 **Water and Electricity for the Works**

These will be made available by the Contractor who shall be liable for the cost of any water or electric current used and for any installation provided especially for his own use.

1.46 **Protection**

The Contractor shall adequately cover up and protect his own work to prevent injury and also to cover up and protect from damage all parts of the building or premises where work is performed by him under the Contract.

1.47 **Defects After Completion**

The defects liability period will be 6 months from the date of practical completion of the Works in the Contract and certified by the Engineer.

1.48 **Damages for Delay**

Liquidated and Ascertained damages as stated in the Contract Agreement will be claimed against the Contract for any unauthorized delay in completion. The Contractor shall be held liable for the whole or a portion of these damages should he cause delay in completion.

1.49 **Clear Away on Completion**

The Contractor shall, upon completion of the works, at his own expense, remove and clear away all plant, equipment, rubbish and unused materials, and shall leave the whole of the works in a clean and tidy state, to the satisfaction of the Engineer. On completion, the whole of the works shall be delivered up clean, complete and perfect in every respect to the satisfaction of the Engineer.

1.50 **Final Account**

On completion of the works the Contractor shall agree with the Engineer the value of any variations outstanding and as soon as possible thereafter submit to the Engineer his final statement of account showing the total sum claimed sub-divided as follows:

Statement A - detailing the tender amounts less the Prime Cost and Provisional Sums, included therein.

Statement B - detailing all the variation orders issued on the contract.

Statement C - Summarizing statement A and B giving the net grand total due to the Contractor for the execution of the Contract.

1.51 **Fair Wages**

The Contractor shall in respect of all persons employed anywhere by him in the execution of the contract, in every factory, workshop or place occupied or used by him for execution of the Contract, observe and fulfil the following conditions:

The Contractor shall pay rates of the wages and observe hours and conditions of labour not less favourable than those established for the trade or industry in the district where work is carried out.

In the absence of any rates of wages, hours or conditions of labour so established the Contractor shall pay rates and observe hours and conditions of labour are not less favourable than the general level of wages, hours and conditions observed by other employers whose general circumstances in the trade or industry in which the Contractor is engaged are similar.

1.52 **Supervision**

During the progress of the works, the Contractor shall provide and keep constantly available for consultation on site an experienced English - speaking Supervisor and shall provide reasonable office facilities, attendance, etc., for the Supervisor.

In addition, during the whole of the time the works are under construction, the Contractor shall maintain on site one experienced foreman or charge-hand and an adequate number of fitters, etc., for the work covered by the Specification. The number of this staff shall not be reduced without the prior written approval of the Project manager or Engineer.

Any instructions given to the Supervisor on site shall be deemed to have been given to the sub-contractor.

One copy of this Specification and one copy of each of the Contract Drawings (latest issue) must be retained on site at all times, and available for reference by the Engineer or sub-contractor.

1.53 **Test Certificates**

The Contractor shall provide the Engineer with three copies of all test reports or certificates that are or may be required by this Specification.

1.54 **Labour**

The Contractor shall provide skilled and unskilled labour as may be necessary for completion of the contract.

1.55 **Discount to the Main Contractor**

No discount to any Sub-Contractor will be included in the tender for this installation.

1.56 **Guarantee**

The whole of the work will be guaranteed for a period of six months from the date of the Engineer's certification of completion and under such guarantee the Sub-contractor shall remedy at his expense all defects in materials and apparatus due to faulty design, construction or workmanship which may develop in that period.

1.57 **Direct Contracts**

Notwithstanding the foregoing conditions, the Government reserves the right to place a "Direct Contract" for any goods or services required in the works which are covered by a P.C Sum in the Bills of Quantities and to pay for the same direct. In any such instance, profit relative to the P.C Sum in the priced Bills of Quantities will be adjusted as deserved for P.C Sum allowed.

1.58 **Attendance Upon the Tradesmen etc**

The Contractor shall allow for the attendance of trade upon trade and shall afford any tradesmen or other persons employed for the execution of any work not included in this contract every facility for carrying out their work and also for the use of ordinary scaffolding. The contractor however, shall not be required to erect any special scaffolding for them.

1.59 **Trade Unions**

The contractor shall recognize the freedom of his work people to be members of trade unions.

1.60. Local and other Authorities notices and fees

The contractor shall comply with and give all notices required by any Regulations, Act or by Law of any Local Authority or of any Public Service, Company or Authority who have any jurisdiction with regard to the works or with those systems the same are or will be connected and he shall pay and indemnify the Government against any fees or charges legally demandable under any regulation or by-law in respect of the works; provided that the said fees and charges if not expressly included in the contract sum or stated by way of provisional sum shall be added to the contract sum.

The contractor before making any variation from the contract drawings or specification necessitated by such compliance shall give the Project Manager written notice specifying and giving the reason for such variation and applying for instructions in reference thereto.

If the contractor within seven days of having applied for the same does not receive such instructions, he shall proceed with the works in conforming to the provision regulation or by-law in question and any variation thereby necessitated shall be deemed to be a variation in accordance to the conditions of contract.

1.61. Assignment or subletting

The contractor shall not without the written consent of the Project Manager assign this contract or sublet any portion of the works, provided that such consent shall not be unreasonably withheld to the prejudice of the contractor.

1.62 Partial Completion

If the Government shall take over any part or parts works, apparatus, equipment etc. then within seven days from the date on which the Government shall have taken possession of the relevant part, the Project Manager shall issue a Certificate stating his estimate of the approximate total value of the works which shall be the total value of that part and practical completion of the relevant part shall be deemed to have occurred, and the Defects Liability Period in respect of the relevant part be deemed to have commenced on the date Government shall have taken possession thereof.

The contractor shall make good any defects or other faults in the relevant part that had been deemed complete.

The contractor shall reduce the value of insurance by the full value of the relevant part

The contractor shall be paid for the part of works taken possession by the Government

1.63 Temporary Works

Where temporal works shall be deemed necessary, such as Temporary lighting, the contractor shall take precaution to prevent damage to such works.

The contractor shall include for the cost of and make necessary arrangements with the Project Manager for such temporary works. For temporary lighting, electricity shall be metered and paid for by the contract

1.64. Patent Rights

The contractor shall fully indemnify the Government of Kenya; against any action, claim or proceeding relating to infringement of any patent or design rights, and pay any royalties which may be payable in respect of any article or any part thereof, which shall have been supplied by the contractor to the Project Manager. In like manner the Government of Kenya shall fully indemnify the contractor against any such action, claim or proceedings for infringement under the works, the design thereof of which shall have been supplied by the Project Manager to the contractor, but this indemnify shall apply to the works only, and any permission or request to manufacture to the order of the Project Manager shall not relieve the contractor from liability should he manufacture for supply to other buyers.

1.65 Mobilization and Demobilization

The contractor shall mobilize labour plant and equipment to site according to his programme and schedule of work. He shall ensure optimum presence and utilization of labour, plant and equipment. He should not pay and maintain unnecessary labour force or maintain and service idle plant and equipment. Where necessary he shall demobilize and mobilize the labour, plant and equipment, as he deems fit to ensure optimum progress of the works and this shall be considered to be a continuous process as works progress. He shall make provision for this item in his tender. No claim will be entertained where the contractor has not made any provision for mobilization and demobilization of labour, plant and equipment in the preliminary bills of quantities or elsewhere in this tender.

1.66 Extended Preliminaries

Where it shall be necessary to extend the contract period by the Project manager the contractor shall still ensure availability on site, optimum labour, materials, plant and equipment. The contractor shall make provision for extended preliminaries, should the contract period be extended and this shall be in a form of a percentage of the total Contractor works. Where called upon in the Appendix to these Preliminaries the Contractor shall insert his percentage per month for extended preliminaries that shall form basis for compensation.

Lack of inserting the percentage shall mean that the sub-contractor has provided for this requirement elsewhere in the Bills of Quantities.

1.67 Supervision by Engineer and Site Meetings

A competent Project Engineer appointed by the Engineer as his representative shall supervise the Contract works. The Project Engineer shall be responsible for issuing all the site instructions in any variations to the works and these shall be delivered through the Contractor with the authority of the Project Manager. Any instructions given verbal shall be confirmed in writing.

The project engineer and (or) the Engineer shall attend management meetings arranged by the Project Manager and for which the Contractor or his representative shall also attend. For the purpose of supervising the project, provisional sums are provided to cover for transport and allowances. The Contractor shall in his tender allow for the provision of management meetings and site inspections, as instructed by the Engineer, and also profit and attendance on these funds. The funds shall be expended according to Project Manager's instructions to the contractor.

1.68 Amendment to Scope of Contract Works

No amendment to scope of sub-contract works is expected and in case of amendment or modification to scope of work, these shall be communicated to all tenderers in sufficient time before the deadline of the tender submission. However during the contract period and as the works progress the Project Manager may vary the works as per conditions of contract by issuing site instructions.

No claims shall be entertained on account of variation to scope of works either to increase the works (pre-financing) or reduction of works (loss of profit-see clause 1.70)

1.69 Contractor Obligation and Employers Obligation

The sub-contractor will finance all activities as part of his obligation to this contract. The employer shall pay interim payment for materials and work completed on site as his obligation in this contract, as the works progresses. No claims will be entertained for pre-financing of the project by the sub-contractor, or for loss of profit (expectation loss) in case of premature termination, reduction or increase of works as the sub-contractor shall be deemed to have taken adequate measures in programming his works and expenditure and taken necessary financial precaution while executing the works. No interest shall be payable to the Contractor, except as relates to late payment as in the conditions of contract clause 23.3. The contractor shall where called upon, insert his price to compensate for any of the occurrence stated here (premature termination, reduction or increase of works),as a percentage of the contract sum in the Appendix to this section.

1.70 APPENDIX TO SUB-CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

1 ADD TO CLAUSE 1.40

There are no labour camps.

2 ADD TO CLAUSE 1.17

Prices quoted shall include 16% VAT. In accordance with Government policy, 3% Withholding Tax shall be deducted from all payments made to the sub-contractor, and the same shall subsequently be forwarded to the Kenya Revenue Authority (KRA).

3. ADD TO CLAUSE 1.66

The amount or percentage that may be inserted in the bills of quantities for this item should not exceed the anticipated Liquidated damages amount for the same period.

SECTION D

GENERAL MECHANICAL SPECIFICATIONS

SECTION D

GENERAL MECHANICAL SPECIFICATION

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SECTION D

GENERAL MECHANICAL SPECIFICATION

2.01 **General**

This section specifies the general requirement for plant, equipment and materials forming part of the Sub-contract Works and shall apply except where specifically stated elsewhere in the Specification or on the Contract Drawings.

2.02 **Quality of Materials**

All plant, equipment and materials supplied as part of the Sub-contract Works shall be new and of first class commercial quality, shall be free from defects and imperfections and where indicated shall be of grades and classifications designated herein.

All products or materials not manufactured by the Sub-contractor shall be products of reputable manufacturers and so far as the provisions of the Specification is concerned shall be as if they had been manufactured by the Sub-contractor.

Materials and apparatus required for the complete installation as called for by the Specification and Contract Drawings shall be supplied by the Sub-contractor unless mention is made otherwise.

Materials and apparatus supplied by others for installation and connection by the Sub-contractor shall be carefully examined on receipt. Should any defects be noted, the Sub-contractor shall immediately notify the Engineer.

Defective equipment or that damaged in the course of installation or tests shall be replaced as required to the approval of the Engineer.

2.03 **Regulations and Standards**

The Sub-contract Works shall comply with the current editions of the following:

a) The Kenya Government Regulations.

b) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.

a) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.

d) British Standard and Codes of Practice as published by the British Standards Institution (BSI)

e) The Local Council By-laws.

f) The Electricity Supply Authority By-laws.

g) Local Authority By-laws.

h) The Kenya Building Code Regulations.

i) The Kenya Bureau of Standards

2.04 Electrical Requirements

Plant and equipment supplied under this Sub-contract shall be complete with all necessary motor starters, control boards, and other control apparatus. Where control panels incorporating several starters are supplied they shall be complete with a main isolator.

The supply power up to and including local isolators shall be provided and installed by the Electrical Sub-contractor. All other wiring and connections to equipment shall form part of this Sub-contract and be the responsibility of the Sub-contractor.

The Sub-contractor shall supply three copies of all schematic, cabling and wiring diagrams for the Engineer's approval.

The starting current of all electric motors and equipment shall not exceed the maximum permissible starting currents described in the Kenya Power and Lighting Company (KPLC) By-laws.

All electrical plant and equipment supplied by the Sub-contractor shall be rated for the supply voltage and frequency obtained in Kenya, that is 415 Volts, 50Hz, 3-Phase or 240Volts, 50Hz, 1-phase.

Any equipment that is not rated for the above voltages and frequencies shall be rejected by the Engineer.

2.05 Transport and Storage

All plant and equipment shall, during transportation be suitably packed, crated and protected to minimise the possibility of damage and to prevent corrosion or other deterioration.

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.

Prior to installation all piping and equipment shall be thoroughly cleaned.

If, in the opinion of the Engineer any equipment has deteriorated or been damaged to such an extent that it is not suitable for installation, the Sub-contractor shall replace this equipment at his own cost.

2.06 **Site Supervision**

The Sub-contractor shall ensure that there is an English-speaking supervisor on the site at all times during normal working hours.

2.07 **Installation**

Installation of all special plant and equipment shall be carried out by the Sub-contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent in accordance with the best standards of modern practice and to the relevant regulations and standards described under Clause 2.03 of this Section.

2.08 **Testing**

2.08.1 General

The Sub-contractor's attention is drawn to Part 'C' Clause 1.38 of the "Preliminaries and General Conditions".

2.08.2 Material Tests

All material for plant and equipment to be installed under this Sub-contract shall be tested, unless otherwise directed, in accordance with the relevant B.S Specification concerned.

For materials where no B.S. Specification exists, tests are to be made in accordance with the best modern commercial methods to the approval of the Engineer, having regard to the particular type of the materials concerned.

The Sub-contractor shall prepare specimens and performance tests and analyses to demonstrate conformance of the various materials with the applicable standards.

If stock material, which has not been specially manufactured for the plant and equipment specified is used, then the Sub-contractor shall submit satisfactory evidence to the Engineer that such materials conform to the requirements stated herein in which case tests of material may be partially or completely waived.

Certified mill test reports of plates, piping and other materials shall be deemed acceptable.

2.08.3 Manufactured Plant and Equipment – Work Tests

The rights of the Engineer relating to the inspection, examination and testing of plant and equipment during manufacture shall be applicable to the Insurance Companies or Inspection Authorities so nominated by the Engineer.

The Sub-contractor shall give two week's notice to the Engineer of the manufacturer's intention to carry out such tests and inspections.

The Engineer or his representative shall be entitled to witness such tests and inspections. The cost of such tests and inspections shall be borne by the Sub-contractor.

Six copies of all test and inspection certificates and performance graphs shall be submitted to the Engineer for his approval as soon as possible after the completion of such tests and inspections.

Plant and equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Sub-contractor's own risk and should the test and inspection certificates not be approved, new tests may be ordered by the Engineer at the Sub-contractor's expense.

2.08.4 Pressure Testing

All pipework installations shall be pressure tested in accordance with the requirements of the various sections of this Specification. The installations may be tested in sections to suit the progress of the works but all tests must be carried out before the work is buried or concealed behind building finishes. All tests must be witnessed by the Engineer or his representative and the Sub-contractor shall give 48 hours notice to the Engineer of his intention to carry out such tests.

Any pipework that is buried or concealed before witnessed pressure tests have been carried out shall be exposed at the expense of the Sub-contractor and the specified tests shall then be applied.

The Sub-contractor shall prepare test certificates for signature by the Engineer and shall keep a progressive and up-to-date record of the section of the work that has been tested.

2.09 **Colour Coding**

Unless stated otherwise in the Particular Specification all pipework shall be colour coded in accordance with the latest edition of B.S 1710 and to the approval of the Engineer or Architect.

2.10 **Welding**

2.10.1 Preparation

Joints to be made by welding shall be accurately cut to size with edges sheared, flame cut or machined to suit the required type of joint. The prepared surface shall be free from all visible defects such as lamination, surface imperfection due to shearing or flame cutting operation, etc., and shall be free from rust scale, grease and other foreign matter.

2.10.2 Method

All welding shall be carried out by the electric arc processing using covered electrodes in accordance with B.S. 639.

Gas welding may be employed in certain circumstances provided that prior approval is obtained from the Engineer.

2.10.3 Welding Code and Construction

All welded joints shall be carried out in accordance with the following Specifications:

a) Pipe Welding

All pipe welds shall be carried out in accordance with the requirements of B.S.806.

b) General Welding

All welding of mild steel components other than pipework shall comply with the general requirements of B.S. 1856.

2.10.4 Welders Qualifications

Any welder employed on this Sub-contractor shall have passed the trade tests as laid down by the Government of Kenya.

The Engineer may require to see the appropriate to see the appropriate certificate obtained by any welder and should it be proved that the welder does not have the necessary qualifications the Engineer may instruct the Sub- contractor to replace him by a qualified welder.

GENERAL SPECIFICATION
FOR
MEDICAL GASES, COMPRESSED AIR AND VACUUM INSTALLATIONS

INTRODUCTION

This standard specification is intended to form part of the general specification to be included in the Standard Tender document as follows:

Part (1) General Conditions of contract.
(2) Preliminary clauses (supplementary to General Conditions)
(3) Technical specification(s)
(4) Schedules of works.
(5) Appendices to specifications.

The specification comprises standard clauses, which can be used to complete specifications for Medical Gases, Air and Vacuum installations in Hospitals. **The clauses are so arranged that they can be selected to suit the requirements of individual schemes and guidance notes are included to assist in the selection and completion of the clauses. All the clauses may not apply. It may also be necessary to add clauses to suit particular requirements. These should be considered for future inclusion in the specification.**

Dimensions and values are given in Metric S.I. units; Imperial equivalents are quoted in brackets. Where precision in equivalent values is not important, the nearest practical or rational equivalent in Metric or Imperial units is given.

Note;- This specification does not cover the requirements for Pathology Departments, Laboratories or Workshop. These departments must be treated separately and supplied from installations independent of Medical installations. Specifications will need to be drawn up based on appropriate sections of H.T.M. 22.
It is intended that design guidance for Medical installations is obtained from H.T.M. 22 and that the requirements arrived at are written into the specification clauses.

REFERENCES

BRITISH STANDARDS INSTITUTION

BS 4	Structural steel sections.
BS21	Pipe Threads.
BS3643	I.S.O Metric screw Threads.
BS341	Valve Fittings for compressed Gas Cylinders.
BS1319	Medical Gas Cylinders and Anaesthetic Apparatus.
BS587	Motor Starters and controllers.
BS2613	The Electrical performance of Rotating Electrical Machinery.
BS2960	Dimensions of 3 phase Electric Motors.
BS3979	Dimensions of Electric Motors, Metric Series.
BS89	Direct Acting Electrical indicating instruments.
BS559	Light Gauge copper tube, imperial sizes-inch Bores.
BS2871	Part 1. copper tubes for water, gas and sanitation – Metric outside Diam's.
BS1172	Phosphorous Deoxidised Non-arsenical copper for General Purposes.
BS1845	Filler Metals for Brazing.
BS1723	Specification for Brazing.
BS487	Part 1 : Fusion welded steel air receivers (for pressures not exceeding 5001b/sq.inch).
BS1123	Safety Valves,Gauges and fittings for air receivers and compressed air installations.

BS1780	Bourdon Tube pressure and vacuum gauges.
BS1701	Air Filters for air supply for compressors,etc.
BS 2831	Methods of air filters in filters used in air comditioning and general ventilation.
BS3928	Methods for sodium flame test for air filters.
BS4001	Care and maintenance of underwater breathing apparatus.
	Part 1 compressed air open circuit type.
	Part 2 standard diving equipment.
BS4275	Selection, use and maintenance of respiratory equipment.
BS 3970	Steam sterilizers.
BS4199	Surgical suction apparatus.
	Part 1 and 2 electrically operated surgical suction apparatus.
BS3636	Methods for proving Gas Tightness of vacuum or pressurised plants.
BS1710	Identification of pipelines.
BS4099	Colours and their meanings when used for indicator lights.
CP3009	Underground piping systems.
BS4957	Hospital Medical vacuum pipe line service.
HTM	Hospital Technical Memorandum

DHSS PUBLICATIONS

Hospital Technical Memorandum No. 22 (HMSO May 1972) Piped medical gases, medical compressed air and medical vacuum installations. Data sheet EE10.11/12 colour code identification for medical gas terminal units and pipe installations.

STANDARD SPECIFICATIONS

MEDICAL GASES, AIR AND VACUUM

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1. GENERAL

Extent of Contract.

The work shall include for supplying, installing, testing ,commissioning ,demonstrating and leaving in proper working order a piped centralised supply system for medical gases comprising **(specify either : *oxygen*, *Nitrogen Oxide/Oxygen mixture*, *carbon dioxide*, *compressed air and vacuum)*** as outlined in this specification. Tenders shall comply in all respects with the specification but the contractor may offer alternatives provided that the differences and advantages are clearly detailed by him on the schedule of alternatives attached which shall be returned with the tender.

Specialist Contractors.

The work shall be tendered for by approved contractors only who are specialists in the installation of medical gas systems and who have permanently employed staff experienced in this type of work. At the time of tendering the contractor shall confirm in writing that he has suitable qualified personnel who would be employed on the project.

Contract Drawings.

The contract drawing to be read in conjunctions with this specification are as follows:

Drawing No.	Title
……..	…….
……..	…….
……..	…….

Any discrepancies between the drawings and the specification shall be clarified with the Engineer before tendering.

As- Installed Drawings

During the course of construction the contractor shall correct one copy of the contract drawings daily as the work proceeds, indicating any change made from the arrangement shown in the contract drawings.

This amended drawing shall remain on site, readily available for inspection, and the amendments must ultimately be transferred to a reproducible copy of the contract drawing.

2. CENTRALISED STORAGE CYLINDER SYSTEMS

Gases to be dispensed from cylinders

The supply system (s) for ((**specify either :** ***oxygen*, *Nitrogen Oxide/Oxygen mixture*, *carbon dioxide*, *compressed air and vacuum)***) shall (each) comprise a centralised battery of cylinders, complete with support tacks, headers ,automatic manifold distribution panel (s) and shall necessary controls ,safety devices ,alarms ,pipework ,valves and terminal units for distributing the gases to the required positions as listed on the schedule of terminal units.

Note: The following shall be supplied from plant installations as specified later.

(a) Oxygen
(b) Compressed Air.
(c) Vacuum.

Location of cylinders.

The cylinders shall be located on the medical gases manifold room(s) as indicated on contract drawing(s) No (s).

Initial complement of cylinders.

The Hospital authority shall be responsible for providing the full complement of cylinders for each gas as required and these will be used initially for purging and commissioning and handing over the system(s) in proper working order.
(see 10.14 and 10.15)

Capacity of System(s)

The capacity of the storage cylinder system(s) shall be as follows; providing equal banks of cylinders, one for 'duty' and one for 'standby' for oxygen, a total of …… cylinders arranged in two separate banks each cylinder having a capacity of …… litres(……cu.ft) for nitrous oxide, a total of …… cylinders arranged in two separate banks each cylinder having a capacity of…….. litres(……..cu.ft) for nitrous oxide oxygen mixture a total of …….. cylinders arranged into separate banks each cylinder having a capacity of…….litres(…….cu.ft).

For carbon dioxide a total of…… cylinders arranged in two separate banks each cylinder having a capacity of ……litres (……cu. Ft) for compressed air a total of…….. cylinders arranged in two separate banked cylinder having a capacity of …….. litres (……..cu. ft).

Cylinder support racks.

The supporting steelwork for the cylinders shall hold them in an **inclined** position against the wall and shall consist of mild steel bulb angle section 178mm x176mm 'rag' bolted to the floor and a separate mild steel angle section 102mm x 76mm x 13mm thick 'rag' bolted to the wall. The steel sections to be to BS.4. The angle section shall have neatly formed semi-circular cut-outs to space and support the cylinders in banks. All securing bolts shall be provided by the specialist contractor who shall mark out the position of holes in floor and walls for drilling by the building contractor. Any grouting in shall be done by the specialist contractor, who shall also erect the steelwork.

Additional Racks for Spare Cylinders.

The following additional storage racks shall be provided and installed in the position(s) shown on the contract drawing(s) numbers(s)…….

The racks to be in accordance with BS. 1319.
……(specify)……Rack(s) each for …… oxygen cylinders
…….litres(……cu.ft) capacity.

……..Rack(s) each for …….. Nitrous oxide cylinders of litres……..cu.ft) capacity.
…….Rack(s) each for ……..Nitrous oxide/oxygen mixture cylinders of…… litres(…….cu.ft) capacity.

…….Rack(s) each for ……..Carbon dioxide cylinders of…… litres(…….cu.ft) capacity.

…….Rack(s) each for ……..Compressed air cylinders of…… litres(…….cu.ft) capacity.

Note;- In cold weather $N_2O/0_2$ mixture tends to separate and the cylinders received should be stored horizontally for 24 hours before use. The racks shall be designed for horizontal storage only. The ambient room temperature shall be within the range of 10ºc to 25ºc.

Automatic manifold assembly.

The manifolds for all the specified gases (and air) shall be as far as possible identical in construction and the following clauses refer to the assemblies any of the "gases".

Manifold Headers

Each bank of cylinders shall be located beneath a high-pressure manifold header securely mounted control panel. The headers shall carry flexible spiral tail pipes on the underside for connecting to the cylinders and each tail pipe shall incorporate a renewable non-return valve on the manifold header to allow removal and replacement of the cylinder without interrupting the supply from others in the same bank.

2.7.2 Non-interchange ability of cylinder connections
The screwed connections of the tail pipes to the cylinder valves shall be designed such that cross connection of the pipe for any one gas cannot be made to any cylinders for the gases, the exception being oxygen and air which to BS. 341 part 1 are identical.

2.7.3 Testing of Headers.
The manifold and tail pipe assembly shall be capable of withstanding a maximum working gauge pressure of 136 bar (1980 p.s.i.)and shall be tested to twice this pressure by the manufacturer at his work and a test certificate supplied.

2.7.4 De-Greasing
The assembly shall be de-greased and delivered to site in a sealed polythene bag or cover and labelled to the effect that if is degreased and shall on no account be contaminated by dirt oil or grease during erection of afterwards.

2.7.5 Manifold Control Panel

Each pair of headers shall connect to a control panel which shall automatically reduced the high pressure gas or air to a low distribution gauge pressure of 4.14 bar+ 0.14 bar (60 p.s.i.$_+$ 2 p.s.i) for gases or 7.3bar + 0.15 bar (105p.s.i. + 2.5p.s.i) for air.

2.7.6 Automatic Operation

The control panel shall dispense gas (or air) from each of the two cylinder banks in turn via a common distribution pipe and when the "duty" bank pressure falls to 7 bar g.(100 p.s.i.) on "gas" manifolds or 10 bar g. (145 p.s.i.) on air manifolds, the panel shall automatically switch over to the "reserve" bank without any interruption of the supply.

The panel shall incorporate a pressure regulator, a pressure switch and automatic valve to each bank in order to carry out the above operations.

It shall be possible to select either bank of cylinders as the duty bank and to change over manually to the reserve bank despite any electrical supply failure.

A reserve pressure regulator to each bank shall automatically take over if the changeover valve fails to operate or if the low-pressure regulator fails to open sufficiently. It shall be possible to carry out maintenance work on the pressure regulators and parts for one bank without affecting the supply from the other bank.

Automatic panel shall be capable of passing 300 litres per minute at a gauge pressure of 4.14 bar (60 p.s.i.) for "gases" and 7.3 bar (105 p.s.i) for air.

2.7.7 Pressure Gauges

The control panel shall incorporate three pressure gauges: one high pressure gauge to each cylinder bank and one common low pressure gauge on the outgoing supply to the distribution pipework.

The gauges shall conform to BS.1780 and be graduated in bars and p.s.i.

Each gauge shall carry the name of the gas on the dial face with warning- "USE NO OIL OR GREASE" Gauge shall be degreased and maintained in this condition before and after installation.

The dials shall be marked with a blue line at the normal working pressure and a red line at the minimum allowable.

2.7.8 Control Panel Identification

Each panel shall carry in large letters on the front the name of the gas being controlled the letters shall be embossed engraved or otherwise marked on so as to be indelible. Painting or adhesive lettering shall not be permitted.

2.7.9 Heated Manifold for Nitrous Oxide and Nitrous Oxide/Oxygen Mixture.

On the Nitrous oxide and Nitrous Oxide/oxygen mixture manifolds, electric heating elements shall be incorporated.

2.7.10 Electricity supply

The manifolds shall be suitable for operating from a …….. volts ,single phase/3 phase and neutral…… Hertz, A.C. supply.

Any internal wiring in the panel shall have a flame- retardant sheathe to comply with I.E.E regulation B. 16.

2.7.11 Precautions against Leakages.

All parts of the control panel shall be constructed of materials, which will not deteriorate during service and lead to leakages. Diaphragm gaskets of pressure regulators shall not be of fibre but brass.

2.8 Service or Emergency Point.

Each gas (or air) installation shall include a service or emergency point in the manifold room on the wall near to the control panel and on the outgoing distribution pipe into which a supply can be connected manually from a standby cylinder when the control panel is to be serviced or has failed.

The service point shall be in form of a terminal unit complete with check valve and isolating valve, into which a flexible pipe with probe can be inserted. See 6.11.8 for details.

The unit shall be capable of passing 275 litres/min. minimum at a nominal gauge pressure of 4.1 bar (60 p.s.i.) with a pressure loss not exceeding 0.55 bar (8 p.s.i.).

The unit shall be rigidly piped up to the distribution main and the height of the unit above floor level shall be such that the flexible pipe probe can inserted easily by a person of average height standing on floor level.

The service point shall be identified indelibly with the name of the gas and by colour code to B.S. 1710 (1971),schedule No. 13 of this specification.

2.8.1 Standby Cylinder and Rack.

The standby cylinder shall be complete with pressure reducing set wit safety relief, high and low pressure gauges, on/off control valve, flexible pipe and probe.

The supply of the cylinder shall be the responsibility of the hospital authority but a supporting steel work rack on the lines of those for the main banks and reducing sets, gauges and valves shall be included in this contract.

Regulators should have a working capacity of 300 litres min. and be set to operate at a gauge pressure of 4.1 bar (60 p.s.i) for oxygen, for nitrous oxide 4.1 bar (60 p.s.i.) and for compressed air 7.2 bar (105 p.s.i.) .

The probe and the connection of the pipe to the pressure regulator shall be non-interchangeable with other gases.

2.8.2 Main Stop Valve.

A main stop valve shall be fitted on the distribution main before the service point is reached in order to allow the control panel to be isolated.
The valve shall be in readily accessible position so that it can also serve as an emergency valve and being located in the manifold room. It need not be housed in a valve box.

2.9 Safety Relief Valve.

A self – closing safety relief valve shall be fitted on the distribution pipe-in between the control panel and the main stop valve. The valve shall flow capacity a head equal to the maximum flow rate of the control panel and shall be set to operate at 25% above the distribution pressure.
The valve shall be of a type which can be locked or sealed and shall be non-ferrous material.
It shall be coupled to a copper vent pipe one size larger than the distribution pipe and vented to atmosphere at a suitable level and position outside the building. The end of the vent pipe shall terminate in an inverted “U” bend with wire mesh and a suitable shied to protect against snow

and ice. The discharge point shall be finally agreed on site by the engineer and contractor to ensure that there is no danger of fire, injury to personnel, contamination or interference with air intakes or windows. The safety valve and vent pipe shall be supplied and installed in a degreased condition. Weatherproof notices shall be fixed at each discharge point stating- DANGER KEEP CLEAR. MEDICAL GAS DISCHARGE POINT.

2.10 Electrical Installation work.

All electrical equipment shall be supplied and installed by the specialist contractor.

The interconnecting wiring shall be carried out to separate specification by the contractor/others.
The specialist contractor shall in all cases supply duplicate wiring diagrams and instruction within…….weeks of being awarded the contract.

Liquid Oxygen Plant

3.1 Extent of Specialist Contractors Work

The oxygen supply to the distribution system shall be from a medical liquid oxygen plant which shall be installed by a specialist oxygen supplier under a separate contract negotiated by the engineer.

The specialist contractor's work shall commence at the valved distribution position installed by the specialist oxygen supplier at the position shown on the Contract Drawing No …….

3.2 Work Specialist Oxygen Supplier

The work shall comprise the supply and installation of a medical liquid oxygen plant at the position shown on Contract Drawing No …….

The plant shall be the vacuum insulated evaporator type and have a capacity equal to ……m^3 (…….cu..ft.) of gaseous oxygen.

The plant will remain the property of the selected supplier who shall remain and re-fill with the liquid oxygen as necessary.

The plant shall include a standby oxygen cylinder twin manifold which shall come into operation immediately the liquid plant ceases to operate from any cause whatsoever.

The manifold assembly shall also remain the property and responsibility of the specialist supplier as regards regular inspection and maintenance but daily running of manifold and replacement of cylinder as required shall be responsibility of the Hospital Authority.

The cost of re-filling evaporator and cylinders will be chargeable to the Hospital Authority.

The manifold shall be located in the open with the liquid plant and shall have a weatherproof covering.

The manifold shall be located in the manifold room as shown on the Contract Drawing Number …….but shall remain the property of the specialist supplier.

3.3 Extent of Specialist oxygen supplier's work, builders work, installation work, insurance

The specialist oxygen supplier shall confirm at the time of commencement of works the following:

1. Supply of drawings and instructions for associated work required to be carried out by others.
2. Identification of pipe work to B.S. 1710 (1971) up to distribution point;
3. Commissioning of plant.
4. Insurance of plant.

3.4 Extent of associated work to be carried out by other contractors on behalf of the Health Authority.

The following will be carried out by others (under separate contracts):

1. Provision of access roads to the plant to take road tankers
2. Hard standing pad of non-porous concrete for tanker when filling the plant
3. Drainage of pad and plant foundation by surface fall to drains at least 6meters away.

4. Access road to manifold room where used
5. Electricity supply to suitable agreed distribution point. Wiring from distribution board to control panels on liquid oxygen evaporator and standby manifold and to tanker moptor starter box. Wiring from panels to alarm system
6. Electricity supply and lighting equipment to illuminate the plant
7. Fire Protection to Fire Officer's requirements
8. Lighting protection if required,.

3.5 Requirements for Buried Oxygen Pipework

The oxygen pipeline from …….. to ……. …….. is to be run underground and this shall be carried in protective glazed earthenware pipe laid on the bottom of a trench 460mm wide x 460mm deep approximately.

The oxygen pipe shall be wrapped in protective tape of approved material. Backfilling of the trench shall be left until the oxygen pipeline has satisfactorily passed pressure tests.
In areas where traffic passes over, steel protective pipes shall be used. The steel pipe shall be coated or wrapped to prevent corrosion.

Medical Compressed Air Plant

4.1 General requirements

The specialist contractor shall supply and install at the position shown on contract drawing number ……a medical compressed air plant having ……. (**Specify either one/ two/ horizontal/ vertical air receiver(s)**)……. (each) served by two identical air compressor units and complete with all necessary controls, safety devices, alarms, oil and moisture separators and air dryers.

4.2 Quality of Air

The air finally delivered to the ward, room or theatre shall be oil free, dust free and dry as specified later. (Clause 4.21)

4.3 Distribution pressure

The pressure in the distribution pipe work shall be initially 7.3 bar +- 0.15 bar (105 p.s.i. +-2.5 p.s.i.) gauge on leaving the plant room, with reducing valve(s) as indicated on the contract drawing(s) to give a pressure of 4.14 bar +- 0.14bar (60 p.s.i +- 2 p.s.i) gauge. See clause 4.22 for further details.

4.4 Maintenance

The plant shall be designed and arranged to facilitate easy and efficient inspection and maintenance, to the satisfaction of the engineer.

4.5 Precautions against vibration and noise

Flexible pipe work connections and resilient mountings shall be provided where necessary to prevent the transmission of vibration and noise to the building and distribution pipe work. The specialist contractor shall be responsible for ensuring that rigid connections are not made either by themselves or others.

4.6 Builder's Work

The specialist contractor shall supply and fix all holding down bolts, anti-vibration mountings and supply details of all foundations and hole positions for the building contractor to provide. The concrete foundation block shall be of adequate mass placed on suitable resilient foundations to damp out vibrations.

4.7 Air Compressor Unit

4.7.1 Definition

Each air compressor unit shall comprise a compressor driven by an electric motor mounted together on a common base plate having anti-vibration mountings.

4.7.2 Duty

Each compressor unit shall be identical and have a free air delivery of …(**specify**)…..m^3 (……cu. ft.) per minute and shall be capable of dealing with the normal load on its own and maintain the gauge pressure in the receiver at ……bar (+ -…….bar) …….p.s.i (+-…..p.s.i.). The two compressors shall be arranged so that one compressor is on duty while the other is on standby.

4.7.3 Type

The compressors shall be of the ……(**specify**)……. ……, suitable for continuous operation and having efficient oil seals of

proved reliability to the lubricated parts of the machine. (See clause 4.21 for oil mist limit) Compressors with P.T.F.E. rings or seals shall not be allowed because possible overheating would liberate offensive gases from this material.

4.7.4 Intercooling and Aftercooling

The compressors shall be of two-stage design with intercooling between stages and final after cooling, so that the air leaving temperature is kept as low as possible in order to reduce condensation and ensure subsequent satisfactory air dryer performance.

4.7.5 Safety Valve

The intercooler shall be air cooled by means of fans integral with the compressor and if thought necessary due to warm site conditions the air supply to the fans shall be ducted from outside in order to provide air as cool as possible.

The specialist contractor shall advice on the necessary for ducted air and shall include for any ductwork in their contract.

4.7.6 Automatic drain traps

Both intercoolers and aftercooler shall be provided with an automatic drain trap with manual by pass each lea via copper tundishes piped to a suitable gully.

4.7.8 Water Cooling

The coolers and cylinders shall be water-cooled and the water supply shall be taken from a storage tank supply in order to ensure that the compressors have a non- interrupted supply. A break tank shall be incorporated between the main tank and the circulating pumps.

4.7.9 Storage Tank

A suitable storage tank supply is available and a connection to this system is made at ……(**Specify location**)…….by the specialist contractor. A storage tank is to be provided of …….litres (…….gallons) capacity and is to be (specify either included in this contract/ provided by others under a separate contract). The specialist contractor shall make the necessary connections from this system.

4.7.10 Water Treatment

The hardness of the local water supply is …….…….. and local treatment of the water before entering the compressors shall be included in this contract.

4.7.11 Non –Recirculated water

The cooling water shall be run to waste via copper tundishes piped to a suitable gully.

4.7.12 Re-circulated Water

The cooling water shall be re-circulated and suitable cooling arrangements shall be included in this contract.

4.7.13 Circulation Control

The cooling water shall be controlled by a thermostatic immersion on the outflow so that the circulation pump is stopped when a pre-determined low temperature setting is reached. The

circulation pump is stopped when a pre-determined low temperature setting is reached. The circulation pump shall be installed in duplicate for study purposes.

4.7.14 Thermometers

Thermometers of the dial type shall be provided at the inlet and outlet of points of the coolers to show compressed air temperatures.

4.7.15 Excessive Air Temperature Protection

In the event of a higher than normal air exit temperature a thermostat shall switch off the compressor(s) and give warnings as described later. The standby manifold shall then be automatically brought into use.

4.7.16 Valves on delivery pipe to receiver.

The two compressors shall supply air to the receiver either through separate delivery pipes or the pipes may join into one common delivery pipe.

An isolating non-return valve shall be fitted on the delivery pipe from each compressor prior to entering the receiver.

4.7.17 Air Unloading Valves

Each delivery type shall carry an automatic air uploading valve, prior to the non-return valve; and operated when the compressor stops so that the high pressure air in this portion of the pipe is released and the compressor can the re-start under no conditions. At the manufacturer's discretion this valve may be omitted on compressor can re-start under no load conditions. At the manufacturers discretion this valve may be omitted on the compressors with less than 5.h.p. motors

4.7.18 Flexible Pipework

The final connection of the delivery pipe or pipes to the receiver shall be in flexible pipe of "armour" quality, to prevent transmission of vibration from the compressors.

4.8 **Air Intake Filter**

4.8.1 Type and Efficiency

The air intake to each compressor shall be through a filter of the dry medium type to B.S 1701 which shall have dust retaining efficiencies of 98% minimum, grade CA, when tested in accordance with that standard.

4.8.2 Sitting of Intakes

The sitting of air intakes shall be outdoors in the open at the position shown on contract Drawing Number …….. but if considered necessary the position may be modified after a final inspection of the site and agreement between the medical officer , the engineer and the contractor, in order to ensure clean air is drawn in.

The length and cross section of the intake shall be approved by the compressor manufacturer to ensure that compressor efficiency is not reduced

4.8.3 Weather Protection

The intakes shall be adequately protected by cowls or other means from the ingress of rain, snow, ice and excessive dust.

4.8.4 Maintenance

The filters shall be arranged for easy access for maintenance servicing and renewal, to the renewal, to the satisfaction of the engineer.

4.9 Air Silencers

The intake filters shall pass the air into silencer assemblies from which the compressors will draw air.

4.10 Permissible Noise Levels

The overall effect of silencers, anti-vibration mountings and compressors (both running) shall not produce sound pressures greater than I.S.O Rating of 75, measured 1.8m away from sides and above the plant.

The contractor shall state the sound pressure levels of the plant being tendered, and this shall be checked and proved on completion of the installation to the satisfaction of the engineer.

4.11 Compressor Electric Motor

Each electric motor shall be continuously rated for the maximum duty to be performed and shall be of T.E.F.C. type for …….volts, …… phase, 50 hertz A.C. supply and conform to B.S. 2613 and B.S 3979 (metric dimensions) with Class E insulation.

The motor shall drive the compressor either by Vee belts or a flexible coupling, which in either case shall be efficiently guarded to satisfy the requirements of the Factories Act.

4.12 Motor starters

Each motor shall have a starter which shall be rated for frequent duty in accordance with B.S 587 and have thermal overload protection.

The starters shall be of the automatic type so that once switched on the motor will be capable of re-starting automatically should the supply be interrupted. This feature shall be indicated by a suitable warning notice displayed on or near the motors. A time delay shall be incorporated to ensure that the two compressors do not start together. Three phase motors shall have single phasing preventors. Each star delta starter shall be electrically and mechanically interlocked to prevent simultaneous star and delta connection.

4.13 Ammeter

An industrial grade ammeter to B.S 89 shall be connected in the yellow phase connection to each motor, the dial will be 75mm diameter.

4.14 Compressor Controls

4.14.1 Duty Selection switch
The two compressors shall run alternately so that one is on duty while the other is on stand by and a change over duty switch shall be provided so that manual selection can be made.

4.14.2 Hour Counter
An “Hour Counter” shall be provided on each compressor to record its total running time and assist in the running time and assist in even running of compressors.

4.14.3 Switches
Each compressor shall have a "hand-off-auto" switch to allow choice of either automatic or manual hand control.

4.14.4 Pressure switches
The compressors shall be controlled by two pressure switches connected to and sensing the air pressure in the receiver.

The "high" pressure switch shall be set to operate the duty motor starter, when the receiver gauge pressure falls to ……. bar (p.s.i.) and to stop the motor when the gauging pressure rises to …….bar (……p.s.i.) and to stop the motor when the gauge pressure rises to ……..bar (….p.s.i).when the compressors are on "hand/manual" control and cut off the motor when maximum pressure is reached.

4.15 Control Cabinet

4.15.1 Compartment Arrangement

The compressor controls shall be arranged together in one metal cabinet with three separate fireproof compartments. The centre compartment shall contain the duty selector switch, wiring and accessories common to both compressors, while the outer compartments each contain the controls for one compressor and its associated equipment.

A drawing of the panel shall be submitted to the engineer before commencing manufacture.

4.15.2 Isolating Switch

The cabinet shall house a load breaking isolating switch interlocked with the cover and the circuits and apparatus shall be protected by H.R.C. fuses.

4.15.3 Regulations

Warning notices shall be incorporated for each compartment to warn the presence of medium voltage.

4.15.4 Manufacture

The cabinet shall be manufactured from sheet steel, rust proofed (zintec) or electro-coated rust inhibited and not less than 2.0 mm (14s.w.g) thick and adequately braced.

The cabinet shall have an external finish of semi-gloss stoved or cellulose enamel to B.S colour ……. Untreated parts shall have a rust inhibitor coat and an undercoat applied before manufacture. The internal finish shall be white.

4.16. Air Receiver

4.16.1 Type
Each air receiver shall be of the (**specify either vertical/ horizontal type)** and have a capacity of ……..m^3 (…….cu.ft.) of "water" and be designed to conform B.S 487 Part 1, Class 3D. (Fusion welded steel air receivers).

4.16.2 Safety Requirements
Each receiver shall be complete with safety valve and fusible plug to B.S 1123 and the safety valve shall be arranged to discharge to a safe position.

4.16.3 Inspection, Cleaning and Draining

Each receiver shall have an inspection cover and cleaning outlet, an automatic condensate drain trap with isolating valve and a manual drain valve, both of which shall discharge via a copper tundish piped to a suitable gully.

4.16.4 Pressure Gauge

A pressure gauge to B.S 1780 shall be fitted on each receiver, the dial to be 150mm (6") diameter graduated in bars and p.s.i. to $1^1/_2$ times working pressure. The gauge shall be complete with isolating valve or cock.

4.16.5 Pressure Switch Connections

Provision shall be made on the receiver for tappings to suit the pressure switch connections for compressor control and for standby manifold control.

4.16.6 Tests Certificates

The receiver(s) shall have been pressure tested and at the manufacturers works in accordance with B.S 487, part 1 and certificates provided.

4.17 Separators and Filters

4.17.1 Duty

The air from the receiver shall pass through a separator and filter assembly installed in duplicate, each assembly to be rated for continuous use of the full free air delivery of the compressor, with the air super saturated with water (100% R.H) at the compressor exit air and temperature.

The assembly shall be suitably valved to allow manual selection of either assembly as required.

4.17.2 Automatic Drain Trap

Each separator shall be complete with an automatic drain trap, with manual bypass valve, draining via a copper tundish piped to a suitable gully.
The traps shall be capable of dealing with moisture and oil droplets and mist carried over the compressors.

4.17.3 Filter Type and Efficiency

When oil free compressors are used, the filters shall be of the oil free dry medium type and have an efficiency of not less than 95% when tested with Test Dust No.2 in accordance with B.S 2831 at the design flow.

When lubricated compressors are used the filters shall have a penetration not exceeding 0.5% when tested by the sodium flame test in accordance with B.S 3928, at the design flow.

4.18 Air Dryers

4.18.1 Type and duty

The air from the separator and filter assemblies shall pass through a desiccant type air dryer assembly, installed in duplicate and of twin column design, each column being capable of dealing with the maximum flow of air (as 4.17.1) while the other is being dried out.

4.18.2 Design

The columns shall be constructed to comply with appropriate requirements for pressure vessels to B.S 487, Part 1, class III D.

The columns shall be designed to facilitate filling with or emptying of desiccant material without the need to disturb pipework connections.

4.18.3 Safety Relief Valve. pressure gauge

Each pair of columns shall be provided with a safety valve to B.S 1780 with dial 100mm (4") diameter, arranged to discharge to a safe position and a pressure gauge to B.S 1780 with a dial 100mm (4") diameter, graduated in bars and psi to $1^1/_2$ times working pressure.
The safety valve and gauge to be fitted beyond the final filters.

The gauges shall be complete with isolating valve or cock. The dials shall be marked with a blue sector showing the working pressure range of the column.

4.18.4 Regeneration Process

The regeneration process to drive of the moisture form the saturated column shall be effected by ……(specify either through electric heating (this method is to be preferred) or bleed from dry air pipe……).

If the electric heating method is preferred, the heating elements shall be designed to give long life and have thermostatic control to prevent overheating.

The heating or drying medium shall be adequate rating so that the time required to dry out a column shall be less than that taken to saturate a column working at full load.

The drying out process shall be controlled so that the heating medium is not used continuously once the column is dry. Heating elements and thermostat elements, if fitted shall be easily removable without disturbing desiccant bed or pipe work connections.

4.18.5 Automatic Air Release on Columns

An automatic operated bleed air valve on each column shall allow the column requiring regeneration to release the high pressure via a silencer discharging into copper tundish piped to a suitable gully, one tundish being provided to each pair of columns.

4.18.6 Automatic Re-Pressurization of Columns

When the column has been dried out, automatic re-pressurization of it shall follow to prevent shock when change over from the saturated column takes place.

4.18.7 Controls

The air dryer assemblies shall be complete with an automatic electric control panel to operate and sequence the valves and change over from one column to the other in a pair.

Change over from one dryer assembly to the other shall be effected by a hand change over switch operating automatic valves to allow either of the assemblies to be selected for duty.

4.18.8 Desiccant Material

The dryer columns shall contain activated alumina desiccant of the non-dusty type in pellet, spherical or tablet form. The grade of desiccant shall such that pre-filters to the final filter on the outgoing side of the dryers are not necessary.

4.18.9 Desiccant Bed Life

Each dryer assembly, with two columns, shall be designed to provide a desiccant bed life of not less than two years on continuous full load so that the installation comprising of two dryer assemblies shall give a total life of two years when operated on a "duty" and "standby" basis.

4.19 Dryness of Air

The dew point of air leaving the dryer shall be minus 40^0 C (minus 40^0F) at atmospheric pressure, equivalent to minus 18^0C (0^0F) at gauge pressure of 7.3 bar (105 p.s.i)

4.20 Final Filter

A filter of the oil free dry medium type shall be fitted on the outgoing side of each dryer assembly. The filters shall have a penetration not exceeding 0.5% when tested by the sodium flame test in accordance with B.S 3928, at the design flow.

4.21 Final Condition of Air at Terminal Units

The air delivered to the terminal units shall be free from deleterious, toxic, flammable, objectionable, products, vapors or odours.

A sample of air at standard temperature and pressure shall not contain more than the following substances in accordance with B.S 4275:-

0.5 mg /m^3 of oil mist particulate.
5.5 mg/ m^3 of carbon monoxide (5 parts per million)
900mg/ m^3 of carbon dioxide (500 parts per million)
dew points as paragraph 4.19

Where sterile air and fine air control is required at the point of use, this is beyond the performance of the plant specified above and will call for additional fine pressure regulators and sterilizable type filters beyond the terminal unit and mounted within the room or theatre. Ensure that the Medical Officers are aware of this.

This equipment is not included in this contract and shall be the subject of a separate contract by the Hospital Authority and thus should be made aware of the same.

4.22 Pressure Regulation on Distribution Main

Pressure regulators shall be fitted on the outgoing main, in duplicate for standby purposes, to control the pressure of the air as it leaves the plant room.

The pressure shall be maintained at a gauge pressure of 7.3 bar (105 p.s.i.) ± 0.15 bar (±2.5.p.s.i.)

The pressure shall be reduced along the system at the positions indicated on the contract drawing(s) number (s) ……(specify the drawings no's)……to gauge pressure of 4.14 bar (60 p.s.i.) ±0.14 bar (± 2 p.s.i).

4.23 Pressure Gauge and Safety Valve on Distribution Main.

One the pressure gauge and one safety relieve valve shall be fitted on the outgoing main following the pressure regulating valves. They shall be of the type and size as described for the receiver vessel. The relief valve shall be vented via copper pipework to a safe position.

4.24 Standby Air Cylinder Manifold

4.24.1 Location

The specialist contractor shall supply and install in the ……(give location of manifold/drawing no.)… ……..(Contract Drawing Number)…….a Standby Medical Quality Air Cylinder Manifold which shall come into operation automatically should the compressed air plant fail.

The ordering of the initial full complement of cylinders and any future replacement cylinders shall be the responsibility of the Hospital Authority.

4.24.2 Capacity

The cylinder supports and headers shall comprise of two banks each with …….cylinders of ……litres (…….cu.ft.) capacity. A stand by supply of one day is recommended.

One bank shall be on duty while the other is on standby

4.24.3 Standby Operation

The standby manifold shall come into operation for any of the following reasons: - Compressors faulty – not maintaining pressure- air temperature too high. Dryer faulty- dew point high. Line pressure 15% below normal.

4.24.4 Manifold Assembly

The requirements of the Standby Manifold shall be as described for medical gas manifolds covering:-

Manifold headers
Non-intercheablility of cylinder connectors
Testing of headers
Degreasing

Control Panel with :-

Either Automatic Operation for " changeover" Or Manual Operation for "changeover" (specify)
Pressure gauges
Identification

4.24.5 Electricity Supply

The standby manifold shall be suitable for operating from a …….. volt, single phase/ 3 phase / and neutral, ……hertz, A.C. supply.

4.24.6 Connection Point into Distribution System

The air, which will be of the correct quality and dryness, will not require further filtering or drying and the standby supply shall be permanently connected into the distribution main in the plant room at a point beyond the pressure gauge and safety valve at the plant room wall.

A non-return valve shall be fitted prior to the above gauge and relief valve to prevent back pressure to the dryers, etc. from the cylinder supply.

A stop valve shall be provided to allow the standby connection to be isolated.

4.24.7 Electrical Installation Work

All electrical equipment shall be supplied and installed by the Specialist Contractor.

The interconnecting wiring shall be carried out to separate specification by the Specialist Contractors /others.

The specialist Contractor shall in all cases supply duplicate wiring diagrams and instructions within …….. weeks of being awarded the contract.

5. MEDICAL VACUUM PLANT

5.1 General Requirements

The Specialist Contractor shall supply and install at the position shown on the Contract Drawing No …… a Medical Vacuum Plant having (**specify** either one/ two/ horizontal/ vertical reservoir vessels(s)) (each) served by two identical vacuum plant units and complete with all necessary controls, drainage traps and bacterial filters. Discharge into an aerobics septic chamber is not permissible due to potential health hazards.

5.2 Degree of Vacuum

The overall design of the system shall be such that the degree of vacuum in the distribution pipework at the back of the remotest terminal unit is not less than 400mm Hg below a standard atmospheric pressure of 760 mm Hg (360 Hg absolute).

5.3 Total Design Flow

The total design flow of the system shall be ……litres of free air per minute minimum.

5.4 Maintenance

The plant shall be designed and arranged to facilitate easy and efficient inspection and maintenance, to the satisfaction of the engineer

5.5 Precautions against Vibrations and Noise

Flexible pipework connections and resilient mountings shall be provided where necessary to prevent the transmission of vibration and the noise to the building and distribution pipe work.

The specialist contractor shall be responsible for ensuring that rigid connections are not made either by themselves or others.

Builder's Work

The specialist contractor shall supply and fix all holding down bolts, anti-vibration mountings and supply details of foundations and hole positions for the building contractor to provide. The concrete foundation block shall be of adequate mass placed on suitable resilient foundations to damp out vibrations.

Vacuum Pump Unit

Definition

Each vacuum plant unit shall comprise a vacuum pump driven by an electric motor mounted together on a common base plate having anti vibration mountings.

Duty

Each vacuum plant unit shall be identical and have a capacity of ……(**specify**)…….…… litres /minute of free air equivalent to a volumetric through output of …….. litres per minute at a vacuum of minus ……mm Hg (…….mm Hg absolute).

The two vacuum pumps shall be arranged so that one pump is on duty while the other is on standby and each shall be capable of dealing with 75% of the total design flow and running continuously at this load.

Water Sealed Pumps

The pumps shall be of the water sealed type and the water supply shall be from a break tank situated to provide the necessary head on the seal water lines.
A self- cleaning strainer shall be from a storage tank in order to ensure that the pumps have a non- interrupted supply.

Water Supply

The water supply to the break tank shall be from a storage tank in order to ensure that the pumps have a non-interrupted supply.

Storage Tank

A suitable storage tank supply is available and a connection to this system is to be made at …… …….by the Specialist Contractor.

A storage tank is to be provided of …… **(specify**)…litres (….. gallons) capacity and is to be included in this Contract / provided by others under a separate contract. The Specialist Contractor shall make the necessary connections from this system.

Water Treatment

The hardness of the local water supply is …… **(specify)** …..…… and local treatment of the water before entering the pumps shall be included in this contract.

Over Flow

The overflow form the vacuum pumps shall discharge via copper tundishes piped to a suitable gully to waste. The water shall not be recycled.

Lubricated Type Pumps- Air /Water Cooled

The overflow from the vacuum pumps shall be of the …… **(specify**)……..type, having oil lubricated cylinders which shall be designed so that the lubricating oil consumption is kept to a minimum.

Water Supply for Cooling

The cooling water shall be taken from a storage tank supply in order to ensure that the vacuum pumps have a non-interrupted supply. A break tank shall be incorporated between the main tank and the circulating pumps.

Storage Tank

A suitable storage tank supply is available and a connection to this system is made at ……by the Specialist Contractor.

*(20) A storage tank is to be provided of ……..litres (……gallons) capacity is to be included in this contract / provided by others under a separate contract. The Specialist Contractor shall make the necessary connections from this system.

Water Treatment

The hardness of the water supply is …….. and local treatment of the water before entering the pumps shall be included in this contract.

Non- Recirculated Water

The cooling water shall be run to waste via copper tundishes piped to a gully.

Re-Circulated Water

The cooling water shall be re-circulated and suitable cooling arrangements shall be included under this contract.

Circulation Control

The cooling water shall be controlled by a thermostatic immersion switch on the outflow so that the circulation pump is stopped when a pre-determined low temperature setting is reached.
The circulation pumps shall be installed in duplicate for standby purposes.

Vacuum Pump Exhaust System

Silencers

The discharge from the vacuum pumps shall pass through silencers in order to keep the noise level down to a minimum. (see also 5.10.5)

Location of discharge pipes

The discharge pipes shall terminate outdoors at high level at the position shown on the Contract Drawing Number ……. but if considered necessary the position may be modified after a final inspection of the site and agreement between the Medical Officer, the Engineer and the Contractor in order to ensure that the discharge cannot constitute a health hazard.

Weather protection

The discharge of pipes shall be adequately protected by cowls or other means from the ingress of rain, snow, ice and wind pressure and sited away from windows and air intakes.

5.10.4 Back Pressure

The exhaust system shall be designed so that the back pressure does not exceed 50 mm Hg (1.0 p.s.i) at the peak demand and this figure shall be taken into account when sizing the pumps.

5.10.5 Permissible Noise Levels

The overall effect of silencers, anti vibration mountings and pumps (both running) shall not produce sound pressure greater than I.S.O rating of 75, measured 1.8 m (6 feet) away from sides above the plant.

The Contractor shall state the sound pressure levels of the plant being tendered and this shall be checked and proved on completion of the installation to the satisfaction of the Engineer.

5.11 Vacuum Pump Electric Motor

Each electric motor shall be continuously rated for the maximum duty to be performed and shall be of T.E.F.C type for ……..volts, ……..phase, 50-hertz a.c. supply and conform to B.S 2613 and B.S 3979 (metric dimensions) with class e insulation.
The motor shall drive the pump either by vee belts or flexible coupling, which in either case shall be efficiently guarded to satisfy the requirements of the Factories Act.

5.12 *(25) Motor Starters

Each motor shall have a starter which shall be rated for frequency in accordance with B.S. 587 and have a thermal overload protection.
The starters shall be of the automatic type so that once switched on the motor will be capable of re-starting automatically should the supply have been interrupted. This feature shall be indicated by a suitable warning notice displayed on or near the motors. A time delay shall be incorporated to ensure that the two pumps do not start together. 3 phase motors shall have single phasing preventors. Each star delta starter shall be electrically and mechanically interlocked to prevent simultaneous star and delta connection.

5.13 Ammeter

An industrial grade ammeter to B.S 89 shall be connected in the yellow phase connection to each motor, the dial to be 75mm diameter.

5.14 Vacuum Pump Controls

5.14.1 Duty Selection Switch

The two pumps shall be run alternatively so that one is on duty while the other is on standby and a change-over duty switch shall be provided so that manual selection can be made.

5.14.2 Hour Center

An hour counter shall be provided on each pump to record its total running time and assist in even running of the pumps.

5.14.3 Switches

Each pump shall have a "hand/manual-off-auto" switch to allow choice of either automatic or hand/manual control.

5.14.3 Pressure Switches

The pumps shall be controlled by two pressure switches connected to and sensing the vacuum in the reservoir.

The "high" pressure switch shall be set to operate the duty motor starter when the reservoir guage pressure falls to ……mg Hg and to stop the motor when the gauge pressure rises to ……mm Hg.

The "low" pressure switch shall be set to operate the standby motor starter when the reservoir gauge pressure falls to …….mm Hg and to stop the motor when the gauge pressure rises to ……..mm Hg.

When the pumps are on hand control and cut-off the motor when maximum working vacuum is reached.

5.15 Control Cabinet

5.15.1 Compartment Arrangement

The vacuum plant controls shall be arranged together in one metal cabinet with three separate fireproof compartments.

The center compartment shall contain the duty selector switch, wiring and accessories common to both pumps, while the other compartments each contain the controls for one pump and its associated equipment. A drawing of the panel shall be submitted to the Engineer before commencing manufacture.

5.15.2 Isolating Switch

The cabinet shall house a load breaking isolating switch interlocked with the cover and the circuits and apparatus shall be protected by H.R.C fuses.

5.15.3 Regulations

Warning notices shall be incorporated from each compartment to warn the presence of medium voltage, to conform to I.E.E regulations A.17 and A.19.

5.15.4 Manufacture

The cabinet shall be manufactured from iron sheet, rust proofed (zintec) or electro-coated rust inhibited and not less than 2.0 mm (14 S.W.G) thick and adequately braced.

The cabinet shall have an external finish of semi-gloss stoved or cellulose enamel to B.S ……

Untreated parts shall have a rust inhibitor coat and an undercoat applied before manufacture.

The internal finish shall be white.

5.16 Vacuum Reservoir Vessel

5.16.1 Type Design

Each Vacuum Reservoir Vessel shall be of the vertical/ horizontal (specify) type and be designed to conform to B.S 487, Part 1, Class III D (Fusion Welded Steel Air Receivers).

5.16.2 Capacity

The capacity of the vessel shall be ……litres "water capacity".

The capacity is intended to be such that the number of start/ stop cycles of the pump on duty does not exceed 30times per hour.

5.16.3 Safety Requirements

Where inadvertent reversal of the pump motor could occur on 3 phase supply, a pressure switch on the inlet pipe between reservoir and pump shall switch off the motor on sensing a positive pressure. A non-return valve shall also be fitted as a further safeguard.

5.16.4 Inspection, Cleaning, Draining

The reservoir(s) shall have an inspection cover, a cleaning outlet and a manual drain valve which shall discharge via copper tundish piped to a suitable gully.

5.16.5 Vacuum Gauge

A vacuum gauge to B.S 1780 shall be fitted on each reservoir, the dial to be 150 mm (6") diameter, calibrated 0-760 mm HG and reading Zero (0) at atmospheric pressure.
The gauge shall be complete with isolating valve or cock. The dial shall be marked with a blue line at the normal working vacuum and a red line at the minimum allowable vacuum.

5.16.6 Pressure Switch Connections

Provision shall be made on the reservoirs for tappings to suit the pressure switch connections for vacuum pump control.

5.16.7 Tests Certificates

The reservoir(s) shall have been pressure tested at the manufacturer's works in accordance with BS 487 Part I to 10.3 bar (150 p.s.i.) gauge.

5.17 Drainage Traps

5.17.1 Duty

The intake to the vacuum vessel from the distribution pipeline shall first pass through a drainage n trap, installed in duplicate, each trap being sized to deal with the total maximum flow.

5.17.2 Sterilizing

The bowls of the traps shall be sterilizable by the following methods:-

a) By means of moist steam at 2.2 bar gauge (32 p.s.i.) and 138^{0}C (280^{0}F) in a porous load sterilizer to B.S 3970.
b) By means of dry heat at 160^{0}C (320^{0}F) for atleast 60 minutes.
The trap bowls shall either be transparent or have transparent windows.

5.17.3 Spare Trap Bowls

Two sets of spare trap bowls shall be included initially to cater for frequency of sterilizing required and to ensure that a sterilized set is available always for change-over purposes.

5.18 Bacterial Filters

5.18.1 Duty

A bacterial filter shall be fitted between each drainage trap and vessel, each filter being capable of dealing with the total maximum flow.
The filter housing shall be distinctly marked with the words "BIO-HAZARD".

5.18.2 Efficiency

The penetration of the filters when tested by the sodium flame test in accordance with B.S 3928 shall not exceed 0.05% at the design flow.

5.19 Operations of Traps and Filters

The traps and filters shall be operated on a duty and standby basis and manually operated valves shall be provided so that either of the sets can be selected and to allow for isolation for maintenance and changing of trap bowls and filters.

5.20 Standby Vacuum Facilities

Standby Emergency Vacuum Facilities are not covered under this contract. An emergency service from portable electric suction apparatus to BS 4199 should be arranged by the Hospital Authority.

5.21 **Electrical Installation**

All electrical equipment shall be supplied and installed by the Specialist Contractor.
The interconnecting wiring shall be carriedout to separate specification by the Specilait contractor / Others.

The specilalist contractor shall in all cases supply duplicate wiring diagrams and instructions, within …… weeks of being awarded the contract.

6. DISTRIBUTION PIPEWORK SYSTEM

6.1 Extent of Pipework

The Specialist contractor shall supply, install, connect up and test all the pipework and valves required from the supply source to the distribution terminals for each gas, air and vacuum.

The pipe sizes and valve positions shall be as given on the Contract Drawings and test procedure as described later.

6.2 Spare Pipeline

The Specialist Contractor shall include for one spare pipeline with valves from the …… (**specify location**) …….to the following departments ……(**specify location**)……as shown on the Contract Drawing(s) Number(s)…….

The pipeline will be used in the future for…… and the pipe sizes and valve position are to be given on the Contract Drawing(s).

The pipeline shall be tested as specified later and left ready in a capped condition for future connection in the manifold room, the terminal end as to be specified later.

6.3 Pipe Installation

6.3.1. Fixing

All pipework shall be fixed without any springing or forcing. A clearance of 150mm (6”) shall be maintained between the pipework and other services. Where pipework crosses other services a clearance of 25mm (1”) minimum shall be maintained.

6.3.2. Gradients

Gradients are not required on gas, air or vacuum pipelines.

6.3.3 Drainage

A full way drain lock is to be provided at the bottom of each main vertical run on the air and vacuum pipework.
Branches on horizontal air pipe work shall be taken from the topside of mains to avoid pockets of moisture.

6.3.4 Diversion Sets

The use of fittings for the diversion sets shall not be permitted and the sets shall be formed from a long length in one piece and cold drawn or hot drawn in a neat manner without bucking or thinning.

6.3.5 Routing to avoid Fire Risk Areas

The routes of the pipework shall avoid fire risk areas including laundries boiler houses, generator rooms, incinerator rooms, storage rooms for combustible materials (unless the pipes are to be cased) , lift shafts and kitchens.

6.3.6 Pipework Supports

Pipework shall be supported at not greater than the intervals shown in the table below:

SPACING OF SUPPORTS FOR COPPER PIPES

Nominal Pipe outside diameter mm BS 2871 Part 1 Table X	Maximum Intervals For Vertical Runs	Maximum Intervals For Horizontal Runs
	Metres	Metres
10	1.2	-
12	1.2	1
15	1.8	1.2
18	2	1.5
22	2.4	1.8
28	2.4	1.8
35	3	2.4
42	3	2.4
54	3	2.7
76.1	3.6	3

Where valves are fitted the pipe shall be supported at both sides of the valve to facilitate valve operation without valve movement.

Fixing brackets or supports shall be of a suitable non-ferrous material or suitability treated to minimize corrosion and prevent electronic action.
The specialist contractor shall drill and plug walls and ceilings as required fastening the supports. Where roof decking is encountered the specialist contractor shall provide cavity fixing devices to fasten the supports.

6.3.7 Pipework in Floors, Walls ,Ceilings

Pipework in rooms and corridors shall be concealed either behind ceiling panels, or in walls, ducts or trucking. Removable covers or panels shall be provided to allow access to pipework.

Pipework shall not be buried solidly in floors, walls or ceiling except with the approval of the Engineer. Approval will normally be given only for tail pipes in one piece from Terminal unit to service duct or ceiling void and for unjointed pipes from control value to void. The route of the buried pipe should be clearly and continuously marked by chalk, colored adhesive tape or otherwise, during construction, to discourage the driving of nails into or near the pipe. Where pipes are to be installed in partition walls the tail pipes of terminal unit shall be in one piece (without joint) form the terminal unit to the service doctor ceiling void.
Service ducts or voids should have adequate ventilation to prevent gas concentration in the event of a leak.
Where pipes pass through floors, walls or partitions, copper sleeves shall project between 1.5 and 3mm (1/16” and 1/18”) beyond finished surfaces and plates shall be fitted. All joints shall be accessible and no joint shall be made so that its inside the pipe sleeve.
Where pipework is to be concealed it shall not be covered over until it has satisfactory passed all pressure tests.
Pipework in service ducts, or voids or in rooms or in corridors where the pipework is not required to be concealed shall be surface run.

6.3.8 Special Precautions against Corrosion.

Where pipework is supported by or is liable to come into contact with timber that has been treated with compounds likely to cause corrosion of copper, the pipe shall be protected locally by impermeable materials such as p.v.c. tape or spacers.

6.3.9. Cleanliness during installation

Great care shall be taken during installation to ensure that no extraneous materials are allowed to enter the pipework. Where any section of the pipework is left incomplete during erection the open end of the pipe shall be sealed immediately with plastic cap.

6.3.10 Bonding and Earthing

Wherever possible, pipeline shall be physically separated form the metal sheath and amour of electric cables and from metal conduits, trunking and bare earth continuity conductor s associated with any cables which operate at low voltage or above.
Where physical separation is impossible or when pipeline are in metal trucking and bed head units the pipeline shall be bonded to the I.E.E Regulations B. 53 and D.10
The consumer Earth Terminal is located in ……(**specify**)……
The largest size is……..mm.

The above work shall be carried out by …….*(**specify whether work to be carried out by specialist contractor or other**)……

6.4 Pipework Material and Size

6.4.1 Material

Pipework material for gases, air and vacuum shall be phosphorous de-oxidized non-arsenical copper to B.S 1172

6.4.2 Sizes

Pipework sizes shall be to metric outside diameters in accordance with B.S. 2871, Part 1, Table X.

6.5 Fittings and Joints

6.5.1 Capillary Fittings

All fittings shall be "high Duty" Capillary Type suitable for a "steam" working pressure of 17bar (250p.s.i.) gauge.

The fittings shall have integral rings of silver brazing alloy complying with composition to B.S 1845 (1966) Table 2, Type AG.11 Brazing by the end-feed method shall not be permitted.

The fitting shall be non-ferrous and capable of withstanding corrosion and dezincification.

6.5.2 Flux

Because of the high temperatures required for their effective use borax or borax based fluxes shall NOT be used.

The flux shall be provided by the Fitting Manufacture to suit the work. Fluxes shall be free from grease and agents which promote corrosion or deposits of chlorides. Care shall be taken to avoid any excess of flux which might enter the pipe bore and when the joint is cool excess flux shall be washed and wire brushed off. A visual inspection of each brazed joint shall be made to confirm that the hardened flux has not formed a temporary seal which holds test pressure.

6.5.3 Fittings

Fittings on moisture eliminators and trap sets for vacuum and compressed air shall be brass competition type fittings, or flanged fittings as appropriate.

6.5.4 Valve Joints. Capillary or Screwed

Joining of valves to the pipelines shall preferably be made with a capillary joint similar to 6.5.1. but the end feed method may have to be used in this case.*(57). If however, the valve connection is screwed a capillary to screwed adaptor shall be used but in this case the joint shall be made by tinning the male thread with soft solder. Litharge and Glycerin or an approved oxygen lutng or scaling compound are also acceptable. See also 6.7.1 .

The screwed joint shall be factory made using silver alloy as specified for capillary fittings and the adaptor screwed up while the "tining" is molten. This shall be done with valves dismantled to avoid damage to internal parts and the same care shall be taken when making the capillary to the damage diaphragms, seating e.t.c.

The parts of the valves shall be maintained in a degreased condition. Screw threads shall be tampered either to B.S. 3643 or BS. 21. Parallel threads shall not be used.

6.6 Degreasing of Pipes and Fittings

6.6.1 Extent. Protection Labeling

All pipework and fittings for medical Gas, air and vacuum shall be degreased at the manufacturer's works, the pipes to be individually fitted with purpose made tightly fitting plastic caps or plugs to protect the bores before dispatch to site. Pipes shall be delivered in bundles in protective wrappings and fittings in sealed polythene bags, no capping required.

The bundles and bags shall be securely and clearly labeled:- "Degreased Materials". For use on Medical Gas Installations. Do not allow to come into contact with oil or grease".

The specialist Contractor shall take great care in storing these materials and any materials contaminated while on site shall be returned to the manufacturer for degreasing, all at the expense of the Specialist Contractor.

6.6.2 Degreasing Processes

The pipes shall be degreased internally by steam, then dried, shot blasted and blown through with medical quality bottled air. After a visual inspection each pipe shall be capped individually at both ends. If steam cleaning is not economical, pipes above 54mm outside diameter may be alternatively cleaned using an approved solvent such as such as methyl chloride, which will leave no poisonous or explosive residues and the fittings shall be dried out, inspected and capped or sealed as specified in 6.6.1.

While the degreasing process is primarily concerned with the bore of pipes care shall be taken to avoid oil or grease on the outside, as being a possible source for bore contamination t occur from.

Degreasing of values is dealt with under 6.7.4.

6.7. Valves on Distribution Pipework

The Specialist Contractor Shall supply and fit valves at the positions shown on the Contract Drawings and any deviations form these positions shall be agreed in writing by the Engineer.

The height of valves is to be stated under “Valve Boxes”, (6.8.3.) but in plant or manifold rooms valves may be arranged differently providing they are easily accessible for emergency or maintenance use.

6.7.1 *(59) Valve Materials and Types

All valves shall be of non-ferrous material and of the non-lubricated type, to the following details. If screwed, threads shall be tampered either to BS.3643 or BS.21 (see 6.5.4.) Parallel threads shall not be allowed.

a) Medical Gas Valves (specify)

Type
Bores
End Connections
Manufacture

b) Compressed Air valves (specify)

Type
Bores
End Connections
Manufacture

c) Vacuum Valves (specify)

Type
Bores
End connections
Manufacture

6.7.2 Direction of Valve Closure

Wheel screw valves shall close in a clockwise direction. Lever Ball Valves shall have the direction of closing indelibly cast or engraved on the wheel by means of an arrow and the word “CLOSE”.

Lever ball valves shall have “ON” / “OFF” cast or engraved on to show when the valve is open or closed.

6.7.3 Maker’s Identification

Each valve shall carry the manufacturer’s serial numbers or identification and valve size.

6.7.4 Pressure Testing and Degreasing

All valves shall be pneumatically tested by the manufacturers to twice the working pressure and afterwards de-greased for medical gas services using a suitable method as given as at 6.6.2 before being individually sealed in polythene bags, capping not required.
The valves shall be securely and clearly labeled:-
“Degreased Valve. For use on Medical Gas installations. Do not allow to come into contact with oil or grease”.

6.7.5 Certificates

A certificate shall be supplied by the manufacturer for each valve or batch stating that pressure tests and degreasing has been carried out and that any solvents have been completely removed.

6.7.6 Valves for System Testing Purposes

The Specialist Contractor shall Supply and fit at the position(s) shown on the Contract Drawings (s), a three-valve arrangement to facilitate providing and testing of the installation(s).

The Principle of the method is shown on schedule No.6 and the procedure laid down under Testing and Commissioning Requirements. The valves shall be of non- ferrous material, de-greased and comply with relevant requirements, as previously specified and to be to following details:-

Type
Bores
End Connections
Manufacture
The valves shall be suitably labelled as described under 6.10

6.7.7. Extended. Phased. Modified, Installations

New work during installation shall be physically separated from the existing system and final joining up left to the last after completing all tests in section 10.

6.8 Valve Boxes

6.8.1 Location

The Specialist Contractor shall supply and install lockable valve boxes for all the medical gas, air and vacuum valves located outside manifold and plant rooms and not contained in ducts or cupboards e.t.c.

6.8.2 Purpose

The boxes shall render the valves tamper proof and shall have a transparent breakable panel to facilitate emergency operation of the valve.

6.8.3 Mounting Height

The valves shall serve for the both emergency and maintenance purposes and because of the former requirement the box and valve shall be mounted at the centre height of 1.22metres (4 feet) above floor level in a position not obstructed in a anyway by other equipment. Boxes for the different gases grouped together may be fixed one above another in which case the mean height is to be 1.22m.

6.8.4 Mounting Depth

The boxes shall be set into the wall with any projection being kept to a minimum and surface mounted boxes shall be avoided if at all possible. The Specialist Contractor shall ascertain from the Architect or Site the nature of the wall into which the boxes will fit.

6.8.5 Standardised Type Boxes

The design of box offered shall be of a standardized pattern through out the installation and have the following features:

a) Ease of access for fitting valve and maintenance
b) Designed so that the pipework can be fitted easily, either by having a split box or other suitable means
c) Ventilation to obviate a possible build up of gas in case of a leak,
d) Non-interchangeable keys so that a maintained permit – to – work system can be operated

e) Keys in duplicate
f) Keys and locks with numbers engraved on
g) Breakable transparent panel
h) Non-interchangeability box covers if this could wrongly identify – covers to be hinged on.
i) Boxes shall accommodate one valve only, ganging not permitted.

6.8.6. Box Material

The boxes shall not be of wooden construction but of robust plastic or metallic material and capable of withstanding hazards from blows, abrasions and fire.

The finished appearance of the boxes shall be such that they match the décor of the rooms and are not unsightly.

6.9. Valves in Ducts or Cupboards

The valves shown on the Construct Drawings in ducts or cupboards are intended for maintenance purpose only and are not required to be in valve boxes, providing the valves are lockable in the open and closed position. Suitable locking arrangements and duplicate non-interchangeable keys shall be provided so that such valves can be included in any permit to work scheme. (See 6.8.5.d.).

Care shall be taken not to install valves in cupboards or ducts which are poorly ventilated or in cupboards used for other materials which could be affected by leakages. Any pipe runs so situated shall be drawn to the attention of the Engineer before proceeding on site.

6.10 Identification of Valves

An engraved label of white "Traffolyte" or similar material shall be permanently fixed adjacent to each valve box to indicate the service and give the following information:

a)	**In Red letter**	**Engraving Required**
1.	Service	e.g. "OXYGEN"
2.	Area Served	e.g. 'WARD 1"
3.	Emergency Instruction	e.g. "IN EMERGENCY BREAK PANEL AND CLOSE VALVE"

b) In Black letters:

1.	Valve number	e.g. "VALVE 6"

This number is for maintenance purpose and is to be agreed later on site.

Valves in ducts or cupboards shall be similarly identified except for emergency instructions.

The titles of areas served shall be finally agreed on site and the labels shall be installed before the systems are tested and commission in order to prove their correctness.

6.11 Terminal Units

6.11.1 Extent of Works

The Specialist Contractor shall supply, install and connect to the distribution pipework all the terminal, install and connect to the distribution pipe work all the terminal units required at the positions shown approximately on the Contract Drawings and as listed on the Schedule of Terminal Units.

6.11.2 Definition

A terminal unit shall be defined as a single outlet point for a specific gas shall be a separate unit for that one gas only.

6.11.3 Fascia Plate

Terminal Units for different gases at one location may be house under a common fascia plate but it shall not be possible to amount the fascia plate incorrectly and reverse or alter the identification of the services. The Units should be mounted on a common back plate to ensure accurate centering of the units and allow precise fitting of the fascia plate so that the probes enter freely.

6.11.4 Mounting Order

The Terminal Unit when viewed facing the units shall be mounted in the following order horizontally from left to right:-

Oxgen. Nit: Oxide. Nit Oxide/Oxy: Mixture Carbon Dioxide. Compressed Air . Vacuum.

6.11.5 Type (select either as required)

The terminal units shall be of the flush mounted type set into the wall. or
the Terminal units shall be of the raised surface mounted type with probe connection made vertically underneath.

6.11.6 Mounting Height

The mounting height of the terminal units above floor level shall be as follows:-

a)	for Flush Mounted Units	1.3m (4'- 4") to centre of Unit
b)	For Raised Surface Mounted Units	1.6M (5'- 2") to centre of unit
c)	For "Rail" Systems areas	1.5.(5'-0") to centre of unit.*(65a)

6.11.7 Exact Positioning of Terminal Unit

The exact position of the terminal units relative to the beds, operating tables, etc. shall be finally agreed between the Medical Officers and Architect/Engineer, and the Architect/Engineer shall provide the Specialist contractor with suitable drawings.

Due regard shall be given to ensure that nursing stall can couple up equipment easily, the short for flexible pipes to apparatus can be achieved without obstruction movement to staff or equipment round the patient and the access to the units for maintenance is easy without disruption to patients or other services.

6.11.8 Essential Design Features of Units

Terminal Units shall be designed to incorporate the following features:-

a. The ability to accept, retain ad release the inserted probe by means of a quick release mechanism designed for single handed operation.
b. A secondary locking mechanism to prevent accidental ejection of the probe which is to be finally removed by hand.
c. Two Valves:-
   i. A valve on the inlet to the unit which can be closed to isolate the unit only, without the need to isolate a complete section when maintenance is carried out.
   ii. A self sealing check valve which is opened by the probe and or withdrawal closes before secondary lock engages.
d. Non-swivel type terminal socket to probe connection so that secondary equipment such as a flow meter is not titled during use.
e. The terminal socket and check valve shall only accept the correct probe for the specified "gas" and not allow intern-changeability with or partial operation by probes for any other service.
f. It shall not be possible to interchange the parts of a unit for one gas with those for a different gas and so enable a probe to be connected to the wrong position.
g. Fascia plates which is such that interchangeability of fascia plates between the different gas terminal units is impossible.
h. The front face around the terminal socket to be exposed and to carry "gas" name and colour identification, unless incorporated as at 6.11.8(7).
i. Identification by shape incorporated on the problem is not an essential feature but if adopted by a manufacturer the following shapes shall be used:-

Service	Shape
Oxygen	Hexagonal
Nitrous Oxide	Round
Nitrous Oxide /Oxygen Mixture	Round with two opposing flats
Carbon Dioxide	Triangular with radiuses corners
Medical Air	Round with one flat
Medical Vacuum	Square

6.11.9 Identification Colours and Wording on Units

The following names and colours shall apply:

Service	Colour	Wording
Oxygen	White	Oxygen
Nitrous Oxide	French Blue	Nitrous Oxide
Nitrous Oxide/Oxygen Mixture	French Blue and white quarters	N_2O+O_2 (50/50)
Carbon dioxide	French Grey	Carbon dioxide
Medical Air	White and Black quarters	Medical Air
Medical Vacuum	Prim Rose	Vacuum

The name and colour shall be permanent and it shall not be possible to transfer either to a different terminal.
Painting on of colour or wording is not permissible.

6.11.10 Pressure Loss Across Terminal Units

The terminal units shall be capable of passing the following flow rates without exceeding the stated pressure losses across the terminal units.

Service	Nominal Gauge Pressure at back of Terminal Unit		Maximum Rate of floor required at this pressure	Maximum permissible loss across terminal unit	
	Bar	p.s.i.	Litre/min.at STP	bar	p.s.i.
Medical Gases	3.93	57	40	0.034	0.5
NitorousOxide/ Oxygen Mixture	3.93	57	275	0.55	8
Medical Air	6.9	100	250	0.34	5
Medical Vacuum	Minus 400mm Hg (360 mmHg absolute)		40	100mm Hg	

The figures relate to the performance required of the terminal units.

The actual design flow rates for purposes of sizing the installation and determining pipeline diameters should be taken from Section V of HTM 22.

7. SPECIAL FITTINS FOR OPERATING THEATRES

7.1. Location and Type

The Specialist Contractors shall supply, install and connect to the distribution pipework in the/each operating Theatre, Room No. (s)……(**specify location**)……. ……. a…… ……. (**specify/describe fitting**) fittings. These fittings are in additional to the wall mounted terminal units specified earlier.

7.2 Gases to be dispensed

The fittings(s) shall supply the following "gases" :-
……..
……
……

7.3 Design of fittings

7.3.1. Boom Assembly, Open Type A

The boom shall be designed to carry flexible pipes connected into standard type flush fitting terminal units mounted at a height of 1.8M (5'-11") above floor level.

7.3.2. Boom Assembly, Enclosed Type B

The boom shall be designed to carry concealed pipes of nylon connected to the distribution Pipework in a suitable wall unit.
The length of the boom shall be …….m(….ft.) and the height shall fit in the room height as given later.

7.3.3 Ceiling Pendant, Multipoint, Type C.

The pendant shall comprise a heavily chromed or stainless steel removable ceiling rose thought which flexible hoses with terminal end connections are suspended.

The connections to the distribution pipework shall be within the ceiling rose space and the design shall be such that all strain is taken off the hose connections

The hose to distribution pipe connections shall not be interchangeable between the different services.

7.3.4 Ceiling Pendant, Single Point, Type D

The Pedant shall comprise a heavily chromed or stainless steel removable ceiling rose through which a flexible hose with terminal end connection is suspended.

The connection to the distribution pipe shall be within the ceiling rose space and the design shall be such be that all strain is taken off the hose connection.

7.3.5 Ceiling Columns, Type E, F and G Rigid or Telescopic

The fittings shall comprise a ceiling mounted column, ……..(specify if rigid or telescopic)……. ……..……..pattern, carrying concealed pipes connected to the distributions shall not be interchangeable between the different services.
The column shall be supported on an overhead track running above the operating table.

7.3.6. Terminal Connections

The terminal connection on all fittings shall only accept standard type probes and shall incorporate all the necessary features of the wall mounted terminal units as regards non-interchangeability, self sealing check valves, isolating valves, identification.

7.3.7. Valves

Where the design of the terminal connection on the fitting or hose does not include an isolating valve, this shall be provided elsewhere weather within or near to the fittings on the incoming distribution pipe work, in any easily assessable position for maintenance purposes.

7.3.8 Special Precautions

The design of all special fittings and hoses shall ensure that during use and movement of the fitting the pipework or hose cannot be twisted, kinked, uncoupled at either end, overstrained or otherwise damaged.

7.3.9 Anti-static Precautions

All fittings and hoses shall be of anti-static construction.

7.3.10 Cleanliness

All fittings shall be designed to present minimum lodgement of dirt, dust. etc. and be easy to keep clean . The materials of construction shall have complete freedom from rusting, scaling or deterioration and may be enamelled finish, stainless steel, or heavily chromed finish.

7.3.11 Order of Arrangement of Terminal Connections

On multi-point fittings the order arrangement of the terminal connections shall be as follows:- Oxygen . Nit:Oxide. Nit:Oxide/ Oxy: Mixture . Carbon Dioxide. Comp.Air. Vacuum

For pendants and columns the above order clockwise nearest to the hinge.

7.3.12 Headroom Clearance

All fittings shall provide a minimum clearance of 1.8m (5'-11") above floor level and on telescopic fittings when in the retracted position.

7.3.13 Dimensions of Fittings

The terminal outlet connections of fittings shall not be more than 1.9m (6'-3") above floor level on booms, pedant hoses and columns.

The depth of fittings and pendant hose length shall suit the height of the room(s) which is/are as follows:-

Room No.	Room Name	Floor to ceiling height
……	……	…….
……	……	…….

These dimensions shall be verified on site by the specialist Contractor.

7.3.14 Structural Requirements for fittings

The specialist contractor shall state in his tender the requirements for structural strength of walls or ceilings to which the special fittings are to be fastened.

7.3.15 Positioning of Special Fittings

The exact positioning of special fittings shall be agreed between the Medical Officers and Architect, and the Architect shall provide layout drawings for the Specialist Contractor.

7.3.16 Electrical Services in Fittings

The …….(**specify type of fitting**) ……shall carry electrical services which shall be in solid drawn rust-proof conduit separate from the medical service pipes.

*The electrical fittings to be provided are as follows:- (**List as required**)

The electrical fittings shall be arranged in a neat manner to fit in with the medical terminal outlets and shall afford easy access for coupling up equipment.

Any associated switching need not be of spark-proof type. The electric supply to the fitting will be ……(**give detail of electricity supply**)……..and the fittings shall be wired up by the Specialist Contractor from a suitable distribution point supplied by others.

8. IDENTIFICATION OF PIPELINES

8.1 Permanent Identification

The Specialist Contract shall carry out identification of the installations(s) by colour coding in accordance with Data Sheet EE 10.11/12 and B.S. 1710 (1971).

The identification shall comprise:-

a) Colour handing applied at valves, junctions; either side of walls, floors and at intervals of about 2m (6 feet) on short runs up to 4m (13 feet) on long straight runs).
b) The name of the service printed on the colour hand in a contrasting colour.
c) An arrow at each colour band showing direction of flow.

Letters to be a minimum of 6mm (¼”) high.
Self-adhesive plastic labels or tapes of approved manufacture my be used as an alternative to painting. Where valves are in a valve boxes and identified by “Traffolyte” labels, colour handing is not required.

8.2. Temporary identification

During installation of piping, individual pipes, valves junctions and ends shall be identified as the work progresses. This identification shall be at intervals similar to final identification requirements and may be made with removable labels. These temporary identification labels must be subsequently replaced by the permanent ones at an appropriate stage.

9.0 Warning and Alarm Systems

9.1 Extent of Works

The specialist Contractor shall supply, install and commission the following warning and Alarm systems comprising a combination of (**select**)flashing/steady lights and audible alarms, for the appropriate services.

9.2 Master and Slave indicating Units

A Master indicating Units shall be installed in …….*(Give room nane/loction)……..to monitor all the services in one combined unit.

The Master Unit shall relay to slave Units installed in the following rooms:-

Room Name	Room No.	Number of Units in Rooms
……		
……		
……		

9.3 Electrical Power

The systems shall work on low voltage D.C. current stepped down from a 250 volt single phase supply via a double earth screened transformer. The power pack may be incorporated in the Master Unit.

9.4 *(76) Essential Features of Flashing Light Units

The Master Unit and Slave Units shall be of similar construction and embody the following features:-

1. On the Master Unit, solid state flasher unit to operate the lamps thought the system.
2. On Master and slave Units, translucent coloured panels for each service engraved with the "fault" conditions.
3. Two under-run low voltage white lamps in parallel behind each panel.
4. A green panel to indicate that the unit is operational.
5. A Standardized size and type of lamp throughout the system.
6. Lamps suitable for rapid on/off flashing operation with long life.
7. Lamp test button on each unit to test all lamps on the unit simultaneously.
8. Audible alarms as indicated in Schedule No. 4
9. On the Master Unit, A Key operated muting switch :-
   a) Make flashing lights steady on Master Unit and Slave Units
   b) Mute Audible alarms on Master Unit only.
10. One each Slave Unit, a key operated muting switch to mute audible alarms.
11. The muting switches to deal with only one alarm signal at a time and to re-set automatically.
12. On the Master Unit a System Alarm Circuit run from a dry battery to indicate:-
    a) Failure of flasher unit.
    b) Failure to low voltage supply.

    These faults to be indicated by a coloured orange engraved panel with steady twin lights and audible alarm with key operated muting switch and automatic =-re-set.

    A test button shall be provided to simulate "a" ad "b" to test the above circuit.

9.5 *(76) Essential Features of Steady Light Units

The Master Unit and Slave Units shall be of similar construction and embody the following features:-

1. Translucent coloured panels for each service engraved with the "fault" condition.
2. A translucent green panel to each service to indicate that low voltage supply is on and services are operating normally.
3. Two under-run low voltage while lamps in parallel being each panel.
4. A standardized size and type off lamp thought the system.
5. Lamp suitable for long life.
6. A lamp test bottom on each unit to test all lamps on the unit simultaneously.
7. Audible alarms as indicated in Schedule No.5
8. On the Master Unit, key Operated muting switch to mute audible alarms on the Master Unit only.
9. On each Slave Unit, a Key operated muting switch to mute audible alarms on the Unit.
10. The muting switches to deal with only one alarm signal at a time and to re-set automatically.
11. On the Master Unit, a System Alarm Circuit run from a dry battery to indicate failed of low voltage supply.
    This fault to be indicated by a coloured orange engraved panel with steady twin lights and an audible alarm with key operated muting switch and automatic re-set.
    A test button shall be provided to simulate low voltage supply failure to test the above circuit.

(Select either9.4 or 9.5)

9.6 Working of Master and Slave Units – "Flashing" System

The units shall indicate the condition of all the monitored services simultaneously and for each service more than one panel may be indicating at a time as outlined in Schedule No. 4.
The audible alarm on each unit shall be common to all the services and be arranged to re-set automatically after being mute d, or if muting is not carried out, after the fault is rectified.

9.7 Working of master and Slave Units – "Steady" System

The units shall indicate the conditions of all the monitored services simultaneously and for each service only one panel will be indicating at a time as outlined in Schedule No.5.
The audible alarm on each unit shall be common to all the services and be arranged to re-set automatically after being muted, or if muting is not carried out, after the fault is rectified.

(Select either9.6 or 9.7)

9.8 Arrangement of Panels on Units

The order in which the services shall be arranged on the Master and Slave Units shall be that adopted for terminal unit:-
When facing the panels the service shall be in the following order reading left to right:-
OXY. NIT.OXIDE. NIT OXIDE. CABRBON DIOXIDE COMPRESSED AIR VACUUM OXY.MIXTURE

9.9 Engraving of Fascia Panels of Units

The fascia panels of the Units shall be engraved with the name of the service, either at the top or bottom of each column of translucent panels.
The function of the various press buttons and switches shall also be engraved on the fascia panels.
All engraving shall be picked out in contrasting indelible colour.

9.10 Monitoring Equipment

The Specialist Contractor shall include for supply and fixing all necessary sensing Devices, Operating switches and Relays on the plant for the initiation of the Warning and Alarms signals. The Sensing devices, etc. on the Liquid Oxygen Plant and Standby manifold shall be supplied and installed by the Specialist Oxygen Supplier.
Absolute reliability and long life .of contracts in relay units shall be as essential feature of the equipment.

The relays shall be energized under normal operating conditions and the alarm contracts shall "break" under "fault" conditions.
The alarm terminal block shall be remote from the electrically isolated from all other terminals and energized from a separate source.

The monitored unit alarm contracts shall be rated at 250 volts 3Amp, 50 Hz and the alarm system contacts at 50 volts, 0.5 Amp, D.C.

On a "Flashing" system the alarm circuit conductors to the slave units shall be suitable so that when the green, white and orange panels on every slave unit are illuminated simultaneously the pressure loss does not exceed 5% of the rated operating voltage.

On a "Steady" System the alarm circuit conductors to the slave units shall be suitable so that when any signal is illuminated simultaneously on all slaves the pressure loss does not exceed 5% of the rated operating voltage.

9.11 Setting of Sensing Devices

The sensing devices shall be set so that the conditions are indicated as soon as the following limits are reached:-

Conditions on Schedule

*(81) **Manual manifolds**

1. When duty bank falls to approximately:-

   (a) 10% of full capacity on oxygen systems
   (b) 8% of full capacity on N_2 $0/0_2$ systems
   (c) 6% of full capacity on N_20 systems

   Automatic Manifold

2. When duty bank becomes "exhausted" and change-over to reserve bank made.

3. When with one bank empty, duty bank falls to approximately:-
   (a) 10% of full capacity on oxygen systems
   (b) 8% of full capacity on N_2 $0/0_2$ systems
   (c) 6% of full capacity on N_20 systems

   Liquid Oxygen Installations

4. When change-over to standby manifold made.
5. When one standby bank becomes exhausted and changeover to reserve bank made.

Medical Compressed Air Plant

6. When “standby compressor cuts in to back up “duty” compressor.
7. When change-over to standby air manifold made (denoting fault on compressors or air temperature too high).
8. when dew point of air from dryers is rising above 0°C (32°F) at 7.3 bar (105 p.s.i.) gauge.

Medical Vacuum Plant

9. When “standby” vacuum pump cuts in to back up “duty” vacuum pump.

All PMG &V Plant Installations

10. When either one or both pumps fail to operate
11. When pressure in distribution pipe work falls to:-
    a. 10% below normal on medical gas lines
    b. 15% below normal on air and vacuum lines

9.12 Electrical Wiring

The interconnecting wiring shall be carried out by others but the specialist Contractor shall supply all necessary wiring diagrams, induplicate, within……weeks of being awarded the contract.

SECTION F

BILLS OF QUANTITIES

AND

SCHEDULE OF UNIT RATES

BILLS OF QUANTITIES AND SCHEDULE OF UNIT RATES

CONTENTS

CLAUSE No.		PAGE NO
1.	GENERAL NOTES TO TENDERERS……	F-1
2.	STATEMENT OF COMPLIANCE……	F-2
3.	BILLS OF QUANTITIES ……	F-3 to F-14
4.	SUMMARY PAGE……	F-15
5.	SCHEDULE OF UNIT RATES……	F-16

GENERAL NOTES TO TENDERERS

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.

2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (**including 16% VAT**).

   In accordance with Government policy, the 3% Withholding Tax **shall be deducted** from all payments made to the Tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA).**

3 All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part there of.

4. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

   Should the sub-contractor install any material not specified here in before receiving **written approva**l from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender for the tender to be deemed valid**.

1. Statement of Compliance

a) I confirm compliance of all clauses of the General Conditions, General Specifications and Particular Specifications in this tender.

b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed: ……*for and on behalf of the Tenderer*

Date: ……..

Official Rubber Stamp: ……

BILLS No. 1

A) PRICING OF PRELIMINARIES ITEMS.

Prices will be inserted against item of preliminaries in the sub-contractor's Bills of Quantities and specification. These Bills are designated as Bill 1 in this Section. Where the sub-contractor fails to insert his price in any item he shall be deemed to have made adequate provision for this on various items in the Bills of Quantities. The preliminaries form part of this contract and together with other Bills of Quantities covers for the costs involved in complying with all the requirements for the proper execution of the whole of the works in the contract.

The Bills of Quantities are divided generally into three sections:-

Preliminaries – Bill 1

Sub-contractors preliminaries are as per those described in section C – sub-contractor preliminaries and conditions of contractor. The sub-contractor shall study the conditions and make provision to cover their cost in this Bill. The number of preliminary items to be priced by the Tenderer have been limited to tangible items such as site office, temporary works and others. However the Tenderer is free to include and price any other items he deems necessary taking into consideration conditions he is likely to encounter on site.
Installation Items – Other Bills
The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.
The unit of measurements and observations are as per those described in clause 1.05 of the section C.

(c) Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The sub-contract shall insert his totals and enter his grand total tender sum in the space provided below the summary. This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document

BILL No. 1
PRELIMINARIES AND GENERAL CONDITIONS

ITEM	DESCRIPTION	QTY	UNIT	RATE (KSHS)	AMOUNT (KSHS)
1	Discrepancies clause 1.02				
2	Conditions of sub-contract Agreement clause 1.03				
3	Payments clause1.04				
4	Site location clause 1.06				
5	Scope of Contract Works clause 1.08				
6	Extent of the Contractor's Duties clause 1.09				
7	Firm price contract clause 1.12				
8	Variation clause 1.13				
9	Prime cost and provisional sum clause 1.14 (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause 1.15				
11	Government Legislation and Regulations clause 1.16				
12	Import Duty and Value Added Tax clause 1.17(Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause 1.18				
14	Provision of services by the Main contractor clause 1.19				
15	Samples and Materials Generally clause 1.21				
	SUB-TOTAL CARRIED TO PAGE F -5				

ITEM	DESCRIPTION	QTY	UNIT	RATE (KSHS)	AMOUNT (KSHS)
16	Supplies clause 1.20				
17	Bills of Quantities clause 1.23				
18	Contractor's Office in Kenya clause 1.24				
19	Builder's Work clause 1.25				
20	Setting to work and Regulating system clause 1.29				
21	Identification of plant components clause 1.30				
22	Working Drawings clause 1.32				
23	Record Drawings (As Installed) and Instructions clause 1.33				
24	Maintenance Manual clause 1.34				
25	Hand over clause 1.35				
26	Painting clause 1.36				
27	Testing and Inspection – manufactured plant clause 1.38				
28	Testing and Inspection – Installation clause 1.39				
29	Storage of Materials clause 1.41				
30	Initial Maintenance clause 1.42				
	SUB-TOTAL CARRIED TO PAGE F-6				

ITEM	DESCRIPTION	QTY	UNIT	RATE (KSHS)	AMOUNT (KSHS)
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause 1.58				
32	Local and other Authorities notices and fees clause 1.60				
33	Temporary Works clause 1.63				
34	Patent Rights clause 1.64				
35	Mobilization and Demobilization Clause 1.65				
36	Extended Preliminaries Clause 1.66(see appendix on page C- 24)				
37	Supervision by Engineer and Site Meetings Clause 1.67	1	ITEM	**250,000**	**250,000**
38	Allow for profit and Attendance for the above				
39	Amendment to Scope of Sub-contract Works Clause 1.68				
40	Contractor Obligation and Employers Obligation clause 1.69(see appendix page C- 24)				
41	Any other preliminaries;				
	Subtotal above Subtotal brought forward from page F-4 Subtotal brought forward from page F-5				
	TOTAL FOR SCHEDULE NO. 1- PRELIMINARIES CARRIED FORWARD TO PRICE MAIN SUMMARY PAGE				

BQ FOR MEDICAL GASES DESIGN WORKS FOR PROPOSED ERECTION AND COMPLETION OF A WARD BLOCK AT MERU COUNTY LEVEL 5 HOSPITAL (PHASE 1)

Item	Description	Qty	Unit	Rate(ksh)	Amount
	Medical Gases Equipment Component cleanliness and protection procedures should be observed with pipes, fittings, components and equipment. Final residual contamination level shall not exceed 100 mg/m² when tested as per ASTM B280. All equipment and items supplied to site should be fully protected against the ingress of dirt and contamination by sealing small components in polythene bags or boxes, individual end capping of pipes, Bundling and sleeving pipework in polythene bags and wrapping or boxing of larger components. All the copper pipes should be cleaned and degreased by oxygen service in accordance with BOC specification 3999394. Fittings should be cleaned, flux removed, dried and degreased for oxygen service in accordance with BOC specification 399856.				
A	**Vacuum Plant** Supply, deliver and install Vacuum plant capable of providing a net flow rate of 950 Litres per minute. The vacuum plant will consist of the connection manifold and the following:-.				
(i)	**2 No. Vacuum Pumps** 2 No. air-cooled vacuum pumps, oil flooded rotary vane type driven by electric motor. Each should have a integral non-return valve to protect the vacuum system and receiver vessel from pressurisation due to inadvertent pump reversal. The pump should have a separator filter to ensure virtually oil free exhaust and gas ballast valves to avoid oil contamination and maintain a high water vapour tolerance. The pump inlet shall be filtered and the exhaust shall incorporate an oil filter. Power requirements for each pump: 415V, three phase, 50Hz. Motor rating 2.2Kw, 5.4A.				
(ii)	Bacterial Filter Assemblies Bacteria removing filters shall be fitted on the vacuum pipeline to prevent the spread of infection. The filters shall be duplex system bacterial filters (twin) fitted with manual isolating valves to permit duty and standby operation. Each filter should be fitted with a sterilisable moisture drainage bowl with isolating cock and differential pressure indicator. The system should ensure bacterial removal to 0.005% when tested to BS 3928 at full hospital design flow. The pressure drop through a clean filter passing the system design flow rate will not exceed 25mm Hg.				
	Contd on next page				

Item	Description	Qty	Unit	Rate	Amount
(iii)	**Receiver Vessels** The receiver vessels shall be constructed to BS 5169 or EN 286 and each having an inspection access panel and manual drain to remove any excess welded steel vessel with a mounting saddle which supports both the pumps and the control panels.				
(iv)	Control Panel A dedicated control panel shall be provided for each vacuum pump, to house the isolating switch, starter, MCB, ammeter, hours run meter, hand/auto switch, vacuum switch and alarm. Under normal conditions the capacity of the plant shall be 100% system design flow with one pump not running. A transducer shall sense the vacuum level and switch the lead pump on or off, maintaining the design vacuum level. During the peak demand the log vacuum pump shall automatically be activated to operate in addition to the lead pump. The pump(s) shall automatically shut down once vacuum levels have been restored. In the event of all pumps failing the second stage remote stage alarm shall be activated by the control panel. Should the primary control circuit fail an independent system with a separate mechanical back-up switch will operate the pumps and also initiate a plant fault alarm. The vacuum plant shall have three stages of alarm conditions:- (a) Plant Faults. (b) Plant Emergency. (c) Pressure Fault. The vacuum plant to be as "**Medplus Vacuum Plant C11-950- P**" or equal and approved.	1	No		
	Total for Vacuum Plant C/F to page F14				

Item	Description	Qty	Unit	Rate	Amount
A	**Automatic changeover manifold supply system and Gas Cylinders** Supply, deliver and install medical gas cylinders and automatic changeover manifold. The manifold supply system should consist of a cylinder rack which locates vertical gas cylinders retrained by chains or other suitable mechanisms. The cylinder rack will be wall mounted or free standing by filling support legs. The gas cylinders shall be connected by flexible tail pipes to a header assembly which runs along the top of the cylinder rack. The change over cylinder banks will be by differential pressure and monitored by a contact switch pressure gauge. The sizes of the manifold will vary according to the number of gas cylinders. The manifold will be fitted with a zone shut-off valve and an alarm panel housed in a box with a lockable hinged cover. The alarm panel shall be connected to a contact alarm gauge on an autochange manifold and will give a warning when the gas cylinder pressure has fallen and the gas cylinder(s) need replacing. The manifold shall be designed and conform to IGC document 12/80E and BCGA code practice CP4,CP5 and CP6 and HTM 20225.	1	Item		
B	Fully charged medical liquid oxygen cylinder of nominal capacity 6,800 litres complete with automatic changeover manifold and cylinder support racks	24	No.		
	Total carried to Collection Page				

Item	Description	Qty	Unit	Rate	Rate
	Terminal Units The terminal units shall conform to BS5682:1984 and IS The terminal units shall accommodate a variable plaster depth of up to a maximum of 16mm. The 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 the normal course of dismantling for repair or maintenance, parts from other gases cannot inadvertently be used. The wall mounted terminals shall incorporate an anti-rotation pin to engage with connected downstream medical equipment ensuring correct orientation. The terminal units to be as medical "**Gem 10 terminal units**" or equal and approved for the following areas:-				
A	Oxygen terminal units	148	No.		
B	Ward vacuum units	148	No.		
C	Probes in all the rooms for gases	296	No.		
	Total for manifold and gas cylinders carried to Collection Page F14				

Item	Description	Qty	Unit	Rate (kshs)	Amount
	Pipework and Fittings				
	Supply, deliver and install grease free copper pipes and tubing suitable for medial gases installations and to conform to EN 1057 with screwed and socketed joints. All pipe connections to be unsintered (degreased) PTTF and according to approved manufacturer's specifications. Rates must allow for all Metal/plastic threaded adaptors where required for the connection of fittings, valves, sockets, sliding and fixed joints, support raceways, isolating sheaths, elastic materials, expansion arms and bends, crossovers, couplings, clippings, connectors, pipe fixing clips, holder bats plugged and screwed for the proper and satisfactory functioning of the system. All the fittings to meet all the requirements described in the **particular specifications.**				
	Copper Pipes				
A	28mm diameter grease free copper pipes suitable for medical gases installations	228	LM		
B	22mm ditto	240	LM		
C	20mm ditto	150	LM		
D	15mm ditto	300	LM		
	Adaptors/Connectors				
E	28 x 22mm adaptors/connectors	110	No.		
F	22 x 15mm ditto	85	No.		
G	20 x 15mm ditto	64	No.		
	Equal Tees				
H	28mm diameter tee	72	No.		
I	22mm ditto	96	No.		
J	20mm ditto	80	No.		
K	15mm ditto	130	No.		
	Bends/Elbows				
L	28mm diameter bend/elbow	64	No.		
M	22mm ditto	90	No.		
N	20mm ditto	70	No.		
O	15mm ditto	96	No.		
	Total for manifold and gas cylinders carried to Collection Page F14				

Item	Description	Qty	Unit	Rate (kshs)	Amount
	Total carried down from previous Page				
	Valves				
A	28mm diameter line ball valves fitted with copper stub pipes such as Madaes or approved equivalent. The valve to be complete with valve boxe, flow meter and identification marks.	30	No.		
B	22mm diameter	36	No.		
C	20mm diameter	148	No.		
D	15mm ditto	148	No.		
	Sandles/brackets				
E	15mm sandles /brackets	40	No.		
F	22mm sandles /brackets	50	No.		
G	28mm sandles /brackets	70	No.		
	Alarm and Zone Service Unit				
H	Alarm and zone service unit fully complying with BS EN 737-3, HTM 2022 & C11 and NSIT connections to BS EN 739 such as **Madaes** or approved equivalent. The alarm system to be as described in particular specifications.	12	No.		
	Total carried to next Page				

Item	Description	Qty	Unit	Rate	Amount
	Total carried down from previous Page				
A	Main alarm and zone service unit	1	No.		
B	Hospital Information System as described in particular specifications.	1	Item		
	Others				
C	Gases flow meters	296	No.		
D	Robust aluminium cross-section trunking with polymer infill strips and seals service module capable of accommodating three terminal units as **Madaes 'environ H Sys'** or approved equivalent.	150	Lm		
E	Allow for connection of standby cylinders and rack to lines of those for the main banks and reducing sets, gauges and valves.	1	Item		
F	Allow for two sets of spare trap bowls for vacuum system	1	Item		
G	Allow for copper sleeves for all pipes passing in floors, walls and partitions.	80	Lm		
H	Allow for permanent and temporary identification of pipelines, valves junctions, valves and ends.	1	Item		
I	Allow for painting and marking of all pipes and fittings	1	Item		
J	Printed catalogues, technical data sheet, manuals and as-built drawings both in hard copy and soft copy. The soft copy to be delivered in compact disc and 2GB flash disk.	1	Item		
K	Allow for flushing the whole system to required cleanliness the satisfaction of the Engineer	1	Item		
L	Testing and commissioning of all medical gases as per the particular specifications and to the satisfaction of the Project Engineer.	1	Item		
	Stationery				
M	Laptop Computer Intel corei 7 sixth generation processor /2.7GHz Quad-core/8GB System RAM/1TB SSD/ win10/HD15.6" Screen/carry case and preinstalled with MS Office 16 and an antivirus as 'Hp Envy Ultrabook'.	2	No.		
N	Workstation with 4no.chairs	2	No		
O	Ream white photocopying paper A/4 80g/m2	20	Ream		
P	HP Laserjet Print Cartridge serial 5A No. CE505A	10	No		
	Total for Pipeworks and other fittings C/F to page F14				

COLLECTION PAGE

Item	Description	Cost (Kshs)
1	Preliminaries and general items from page F6	
2	Total for vacuum plant carried forward from page F9……..……	
3	Total for manifold and gas cylinders carried forward from page F11 ……..…	
4	Total for terminal units and probes carried forward from page F12 ……..……	
5	Total for Pipeworks and other fittings carried forward from page F13 ……..…	
6	Contingency to be used at the discretion of the engineer	2,000,000.00
	Total for medical gases installations carried forward to Tender Page	

Amount in words……...
……
……

Tenderer's name and Stamp
……
……..

Sub- Contract period: ……. Weeks

Signature …….. Date

PIN NO. ……. VAT CERTIFICATE NO:
(Provide copy)

Witness Address:
…….

Date: ……..

SECTION G:

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

CONTENTS

CLAUSE No.		PAGE
1.	GENERAL NOTES TO THE TENDERER…….	G-1
2.	TECHNICAL SCHEDULE…….	G-2
3.	TECHNICAL DATA …….	G-3 to G-4

TECHNICAL SCHEDULE

1. General Notes to the Tenderer

1.1 The tenderer shall submit technical schedules for all materials and equipment upon which he has based his tender sum.

1.2 The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings described in the technical schedules. Manufacturer's literature shall be accepted. Failure to comply with this may have his tender disqualified.

1.3 Completion of the technical schedule shall not relieve the Contractor from complying with the requirements of the specifications except as may be approved by the Engineer.

TECHNICAL SCHEDULE

The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule (fill forms attached).

ITEM	DESCRIPTION	MANUFACTURER	COUNTRY OF ORIGIN	REMARKS (Catalogue No. etc.)
1.	Automatic changeover manifold supply system and gas cylinders			
2.	Oxygen terminal unit			
3.	Ward vacuum unit			
4.	Probes			
5.	Copper pipe			
6.	Alarm zone service unit			
7.	Main alarm			
8.	Gas flow meter			
9.	Vacuum pump			
10				

The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings, as described in the technical schedule.

SECTION H:

DRAWING SCHEDULE

CONTENTS

CLAUSE No.		PAGE
1.	DRAWING SCHEDULE…….	H-1

DRAWING SCHEDULE:

As shall be provided during project implementation.

SECTION I:

STANDARD FORMS

NOTE:

ALL FORMS IN THIS SECTION MUST BE FILLED AS THEY SHALL BE PART OF THE EVALUATION CRITERIA

STANDARD FORMS

CONTENTS

FORM		**PAGE**
1.	PERFORMANCE BANK GUARANTEE……..	I-1
2.	TENDER QUESTIONNAIRE……	I-2
3.	CONFIDENTIAL BUSINESS QUESTIONNAIRE……	I-3 toI-4
4.	KEY PERSONNEL……	I-5
5.	CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS..	I-6
6	SCHEDULE OF ON-GOING PROJECTS……..	I-7
7	FINANCIAL REPORTS FOR THE LAST FIVE YEARS ….	I-8
8	EVIDENCE OF FINANCIAL RESOURCES……..	I-9
9	NAME OF THE BANKERS……..	I-10
10	DETAILS OF LITIGATIONS OR ARBITRATION PROCEEDINGS ……	I-11
11	SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR CARRYING OUT THE WORKS……	I-12

PERFORMANCE BANK GUARANTEE

To:

Chief Officer, Health
County Government of Meru,
P.O. Box 120-60200,
Meru

WHEREAS …….(hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. …… dated …… to execute …… (hereinafter called "the Works");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of:
Kshs. ……. (*amount of Guarantee in figures*)
Kenya Shillings
……
…….(*amount of Guarantee in words*),
and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of Kenya Shillings ……..
…….. (*amount of Guarantee in words*) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change, addition or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of Completion.

SIGNATURE AND SEAL OF THE GUARANTOR …….

Name of Bank …….

Address ……

Date ……

TENDER QUESTIONNAIRE

Please fill in block letters.

1. Full names of Tenderer:

   ……

2. Full address of Tenderer to which tender correspondence is to be sent (unless an agent has been appointed below):

   ……

3. Telephone number (s) of Tenderer:

   ……

4. Telex/Fax Address of Tenderer:
   ……

5. Name of Tenderer's representative to be contacted on matters of the tender during the tender period:
   ……

6. Details of Tenderer's nominated agent (if any) to receive tender notices. This is essential if the Tenderer does not have his registered address in Kenya (name, address, telephone, telex):

   ……

   ……

_____
Signature of Tenderer

CONFIDENTIAL BUSINESS QUESTIONNAIRE

You are requested to give the particulars indicated in Part 1 and either Part 2 (a), 2 (b) or 2(c) and (2d) whichever applies to your type of business.

You are advised that it is a serious offence to give false information on this Form.

Part 1 – General

Business Name ……

Location of business premises: Country/Town…….

Plot No…… Street/Road ……

Postal Address…… Tel No……..

Nature of Business……..

Current Trade Licence No…… Expiring date……

Maximum value of business which you can handle at any time:
Kenya Shillings……

Name of your bankers……

Branch……

Part 2 (a) – Sole Proprietor

Your name in full…… Age……

Nationality…… Country of Origin……

Citizenship details ……

Part 2 (b) – Partnership

Give details of partners as follows:

	Name in full	*Nationality*	*Citizenship Details*	*Shares*
1.	……	……..	……..	……..
2.	……	……..	……..	……
3.	……	……	……	……
4.	……	……	……	……

Part 2(c) – Registered Company

Private or Public ……

State the nominal and issued capita of the company:

Nominal KShs. ……..

Issued KShs. ……..

Give details of all directors as follows:

	Name in full	*Nationality*	*Citizenship Details**	*Shares*
1.	……..	……	……..	……..
2.	……..	……	……..	……..
3.	……..	……	……..	……..
4.	……..	……	……..	……..

Part 2(d) Interest in the Firm:

Is there any person/persons in the employment of the Government of Kenya WHO has interest in this firm? Yes/No ……. (Delete as necessary)

I certify that the above information is correct.

……..	…….	…….
Title	Signature	Date

* *Attach proof of citizenship*

KEY PERSONNEL

Qualifications and experience of key personnel proposed for administration and execution of the Contract.

POSITION	NAME	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

I certify that the above information is correct.

…….. ……... ……. ……...……

Title Signature Date

CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS

Work performed on works of a similar nature and volume over the last five years.

PROJECT NAME	NAME OF CLIENT	TYPE OF WORK AND YEAR OF COMPLETION	VALUE OF CONTRACT (Kshs.)

I certify that the above works were successfully carried out and completed by ourselves.

……. ……. …….

Title Signature Date

SCHEDULE OF ON-GOING PROJECTS

Details of on-going or committed projects, including expected completion date.

PROJECT **NAME**	NAME OF CLIENT	**CONTRACT SUM**	**% COMPLETE**	**COMPLETION DATE**

I certify that the above works are currently being carried out by ourselves.

…….	……	…….
Title	Signature	Date

FINANCIAL REPORTS FOR THE LAST FIVE YEARS
(Balance sheets, Profits and Loss Statements, Auditor's reports, etc.
List below and attach copies)

1. ._____.

2. ._____.

3. ._____.

4. ._____.

5. ._____.

6. ._____.

7. ._____.

8. ._____.

9. ._____.

10 ._____.

EVIDENCE OF FINANCIAL RESOURCES TO MEET QUALIFICATION REQUIREMENTS
(Cash in Hand, Lines of credit, e.t.c. List below and attach copies of supportive documents.)

1. ._____.

2. ._____.

3. ._____.

4. ._____.

5. ._____.

6. ._____.

7. ._____.

8. ._____.

9. ._____.

10 ._____.

NAME, ADDRESS AND TELEPHONE, TELEX AND FACSIMILE OF BANKS
(This should be for banks that may provide reference if contacted by the employer)

NAME	ADDRESS	TELEPHONE	TELEX	FACSIMILE

DETAILS OF LITIGATIONS OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER IS INVOLVED AS ONE OF THE PARTIES

1. ._____.

2. ._____

3. ._____.

4. ._____.

5. ._____.

6. ._____.

7. ._____.

8. ._____.

9. ._____.

10 ._____.

SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR CARRYING OUT THE WORKS

ITEM OF EQUIPMENT	DESCRIPTION, MAKE AND AGE (Years)	CONDITION (New, good, poor) and number available	OWNED, LEASED (From whom?), or to be purchased (From whom?)