TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

Employer:

OASI Foundation
5, Triq Wied Sara
Victoria
VCT 2963, Gozo,
Malta

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1.1 FORM OF TENDER

TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

To: **OASI Foundation**

Having examined the Tender Documents consisting of the Contract Conditions, Specifications, Bills of Quantities, Drawings, Schedules for the above mentioned works, we, the undersigned offer to supply, deliver, install, connect-up, test, commission, hand-over and maintain the whole of the said works in conformity with the said Tender Documents for the sum of

_____

or such other sum as may be ascertained in accordance with the said Conditions.

We hereby undertake that if our tender is accepted to commence the works and to complete and deliver the whole of the works within _____ weeks from the date of the letter of acceptance.

We declare that we have visited and inspected the Site and have read and understood the Tender Documents.

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.

We understand that you reserve the right not to accept the lowest or any tender you may receive.

We agree to abide by this Tender for a period of forty-five (45) calendar days from the closing date for submission of tenders and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

DATE: _____

SIGNATURE: _____

NAME IN BLOCKS: _____

POSITION: _____

ON BEHALF OF: _____

ADDRESS: _____

1.2 FORM OF AGREEMENT

TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

This agreement made the _____day of _____

BETWEEN

_____

in the capacity of

_____

(Hereinafter called the "Employer") of the one part; and

AND BETWEEN

_____

in the capacity of

_____

(Hereinafter called the "Contractor") of the other part.

Whereas the Employer is desirous that certain Works be carried out by the

Contractor, namely: _____

_____

_____

and has accepted a Tender by Contractor for the provision, execution and maintenance of such Work, NOW THIS AGREEMENT WITNESS AS FOLLOWS:

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

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

a) The Letter of Acceptance, if applicable
b) The said Tender
c) The Performance Bond, if applicable
d) The Conditions of Contract
e) The Technical Specifications
f) The Tender Drawings
g) The Bills of Quantities

h) The List of Manufacturers

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor hereby convenants with the Employer to provide, execute, complete and maintain the Works in conformity in all respects with the provisions of the Contract.

4. The Employer hereby convenants to pay the Contractor, in consideration of the provision, execution, completion and maintenance of the Works at the Contract Price at the times and in the manner prescribed by the Contract.

IN WITNESS whereof, the parties hereto have caused their respective signatures on the day and year above written.

FOR AND ON BEHALF OF	FOR AND ON BEHALF OF
_____	_____
THE EMPLOYER	THE CONTRACTOR
_____	_____
_____	_____
_____	_____
WITNESS	WITNESS
ADDRESS:_____	ADDRESS:_____
_____	_____
_____	_____
OCCUPATION:_____	OCCUPATION:_____
_____	_____

1.3 COMPANY INFORMATION SHEET

TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

Name of Tendering Company: _____

Address: _____

_____

_____

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Signature of Director: _____

Date: _____

No. of full time employees to be engaged on the project: _____

Name and contact details of person who will be responsible for this project

_____

_____

_____

1.4 INSURANCE DECLARATION

TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

This is to certify that _____ will be covered

by insurance issued by this Agency and in accordance to the Conditions of Contract.

We confirm that we have examined all Clauses of this Contract and that we are familiar with the General and Special Conditions as well as the Specifications and method statements of this Contract.

We also confirm that the policy will be valid during the Completion period and up to the expiring of the Defects Liability Period.

Name of Insurance Agency: _____

Address: _____

_____

_____

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Signature: _____

Date: _____

2.0 INTRODUCTION

2.1 Scope of Works

TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

2.2 Definitions

The *Tenderer or Tendering Company* shall refer to all those participants who have manifested an interest in participating in this offer.

The "Employer'' shall refer to **OASI Foundation** and persons authorized to act on its behalf.

The "Contractor" shall mean the person or persons or Company to which the contract is awarded and who shall carry out the works as described in this document.

The "Architect" shall mean the Architect and Civil Engineer acting on behalf of the Employer.

The "Engineer" shall mean the Consulting Engineer acting on behalf of the Employer.

The "work" shall mean the work as described in the specifications, bill of quantities and drawings included in this document.

The "site" shall mean the site where the works as described in this document shall be executed and which shall be as stated in the Form of Tender.

"Approval" shall mean the Engineer's written approval.

"Variation" shall mean changes in the quantity of work which may be required for the completion of the works.

"Completion date" shall mean the date when the services are fully completed, operational and approved by the Engineer.

3.0 GENERAL

3.1 Scope of Tender

TENDER FOR THE SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF THE AIR CONIDITIONING SYSTEMS FOR OASI FOUNDATION PREMISES IN TRIQ WIED SARA, VICTORIA

3.2 Contractors' responsibilities

The Contractor shall be responsible for:

a) The execution of the works in an informed, competent and diligent manner.

b) Providing throughout the Contract period such supervision as may be necessary to ensure the proper execution work and as requested by the Engineer.

c) Drawing the Engineer's attention to any discrepancies between the design, drawings, specifications or instructions or any inconsistency or omission in either of them immediately prior to commencing any work relative thereto.

d) Indemnifying the Employer against all claims at any time on account of patent right or royalties, whether for manufacture or use on this Contract.

e) Completing the works to the Engineer's satisfaction and demonstrating the satisfactory performance of the services in accordance with the design.

3.3 Extent of works

The works shall comprise all the labour and supervision required and all the materials necessary to form a complete installation and such tests, adjustments and commissioning as are prescribed in the subsequent clauses and as may otherwise be required to give an effective working installation to the satisfaction of the Engineer and, above all, in accordance with the normal code of practice.

The words "complete installation" above shall mean not only the major items of plant and equipment conveyed by this specification, but all the incidental sundry components necessary for the complete execution of the works and for the proper operation of the plant and installation, with their labour charges, whether or not these sundry components are mentioned in detail in the Tender documents issued in connection with this contract.

3.4 Inclusion of everything necessary

The Drawings, Specifications and Bills of Quantities detail, as far as possible, the whole of the estimated requirements for the complete installation for this project. The Tenderer/Contractor, however, must satisfy himself that the Drawings, Specifications and Bills of Quantities do include all necessary materials/ equipment,

etc., for the correct and proper operation of the various services, and no extra cost shall be allowed for any omissions in this respect once the Contract is let.

3.5 Tender Documents

The Tender Documents are those listed below and should be read in conjunction with any Addenda issued:

(i) The Conditions of Contract
(ii) Specifications
(iii) Bills of Quantities
(iv) Drawings

3.6 Interpretation and precedence of documents

The Specifications, Drawings and Bills of quantities shall be read jointly. The Contractor shall be responsible to draw the Engineer's attention in case of discrepancies which may arise between these documents, before submission of the tender document. No additional cost will be allowed for omissions in this respect once the Contract is let.

The Specifications shall have precedence over the Drawings and Bills of Quantities in this order in so far as the technical quality of the equipment and materials.

The Drawings shall have precedence over the Bills of Quantities and Specification in this order as far as the quantity of equipment and materials required, as well as their location.

The Bills of Quantities shall have precedence over the Specification and Drawings in so far as unit rates.

3.7 Variations

The Engineer shall reserve the right to order variations in the specifications and/or quantity of any material or equipment as may be necessary.

If the Contractor claims that any variations shall involve extra cost, he shall submit his claim in writing before proceeding with the work, failing which the Contractor shall have no valid claim for compensation and/or extension to the contract period.

Variations that involve extra cost shall be valued at the contract rates. For work that cannot be properly quantified, a fair evaluation shall be made by the Engineer.

3.8 Drawings

Unless otherwise indicated or directed by the Engineer the Contractor shall provide the following drawings:

a) Four (4) sets of Builders' Works Drawings;

b) Four (4) sets of Detailed Installation drawings;

i) Four (4) sets of Connecting schedules, detailing the relevant circuitries, their identifications; their connection in the distribution switchgear and switches; their current capacity and the related fuse ratings;

j) The contractor shall also provide four (4_) sets of Builder's Work Drawings within two weeks of the acceptance of this Tender.

d) Four (4) prints of 'As fitted' drawings, together with one (1) set of original transparencies carried out in ink on a non-tear plastic base material. All drawings shall be in any of the standard sizes of 'AO' to 'A4' of B.S. 4329.

During the course of the works, the Contractor shall maintain a fully detailed record of all the changes from the Tender and Installation drawings to facilitate easy and accurate preparation of the 'As fitted' drawings and to ensure that these drawings are in all respect a true record of the installation and including the following details:

i) Position of all apparatus;

ii) Size and type of cable;

iii) Size and type of conduit and trunking and number of cables enclosed therein;

iv) Routes of all cables run in ducts, their positions and any joints;

v) Schematic and wiring diagram of system.

3.9 Site meetings

The Contractor shall send a competent representative to such site meetings as may be called by the Engineer, Architect or Employer and shall have the authority to issue instructions to the Contractor's own labour force employed on site. The Engineer, Architect or Employer shall have full access to the works and any other places where material for installation is being prepared. The Contractor shall not cover up permanently any work before the approval of the Engineer.

3.10 Materials

All materials used in this contract shall comply with the latest edition of the relevant Standards Specifications or equivalent as acceptable to the Engineer.

The Engineer shall have the right to order the removal and replacement of any material from the site, which is not to specification or standard. The Contractor shall carry out such order at his own cost.

3.11 Temporary supply of electrical power

The Contractor shall be responsible for the procurement of any temporary supply of electrical power to enable execution of the works. Any attributable costs shall be deemed to have been included in the tendered rates.

3.12 Subcontracting

The Contractor shall not transfer or assign the contract in whole or in part without the written consent of the Engineer and Employer. Any such consent, if given, shall not relieve the Contractor from any liability or obligation under the contract, and he shall be responsible for the acts, defaults and neglect of any-sub contractor and his employees or agents.

3.13 Tender Documents

Tender Documents may be obtained from **the offices of GALEA CURMI ENGINEERING CONSULTANTS LTD** by way of email or similar electronic communication.

3.14 Tenderers to visit the Site

All Tenderers are strongly advised to visit the site and familiarise themselves with the constraints and logistically limitations of the place in order to complete the works within the stipulated contract period. Appointments for such inspection shall be made during office after making an appointment with the Engineer for this purpose.

Under no circumstances shall the Contractor claim any compensation and/or disclaim any responsibilities from not visiting the site prior to tendering.

3.15 Programme of Works

The Contractor shall submit a preliminary program of works together with his tender. A detailed program of works shall be prepared together with the Engineer within one week of the issue of the letter of acceptance for approval by the Employer. This program shall be used to monitor the progress of the work during the execution period

Failure of any Tenderer to comply with this requirement shall constitute sufficient grounds for the disqualification of the respective offer.

3.16 Completion Period

All items of work assigned to the contractor are to be carried out within:

- 10 weeks from order to start works.

The entire AC system has to be tested and commissioned by the 5th September 2025.

Tenderer to provide a Gantt chart for achieving this milestone.

3.17 Extension of period of completion

No extension of the completion date agreed upon shall be given to the Contractor with the exception of civil commotion or national calamities, hostilities, force majeure and or national strikes.

Should the amount of any variation or other special circumstance which may occur be such to fairly entitle the Contractor to an extension of time for the completion of work, the Engineer shall determine the amount of such extension. Notwithstanding the above, the request for extension shall be raised by the Contractor within 2 days of any such variation order for approval or otherwise by the Engineer. Otherwise the Contractor will lose the benefit of time.

Delays in delivery by overseas suppliers shall not be considered as sufficient reason to warrant an extension of the time of completion.

3.18 Penalty for Delay

The Contractor shall complete the installation work by the time of completion agreed upon in the Contract subject to any extensions given in writing by the Engineer.

If the work is not completed and delivered within the time specified in the contract, the Contractor shall be liable to a penalty equal to 1% (one per centum) of total Contract value for each week of delay or part thereof; subsequently as from fourth week of delay the applicable penalty shall be raised to 2% (two per centum) of total Contract value and so henceforth per week up to a maximum penalty value of 15% (fifteen per centum) of total Contract value. The Contractor shall be liable for consequential losses incurred by the Employer if the delay is over two months. Such penalty shall be automatically deducted from any amounts otherwise due to the Contractor.

3.19 Defects Liability Period

The Defects Liability Period shall be a period of twelve (12) months for the entire works specified in these Documents from the practical completion and hand-over of the works and/or part of the works to the Employer. This period shall not be deemed to have expired until the Contractor has made good all defects or faults to the Engineer's satisfaction. During this period, faults or defects, which in the opinion of the Engineer, are due to faulty materials, workmanship, components, the Contractor shall then at his cost, remedy such defects.

If the Contractor fails to carry out such rectification work as may be required to meet the Defects' Liability, the Engineer may make other arrangements to have these works carried out at the expense and risk of the Contractor and will be deducted from the 10% Retention Money.

3.20 Interim Payments

Certificates of payment may be issued by the Engineer at intervals of not less than one calendar month after completion of the works or part thereof.

3.21 Statement of works carried out

The Contractor shall submit a statement having a similar format to the bill of quantities, to the Engineer showing the quantity and value of works executed until the end of the month. Provided he agrees with the statement; the Engineer will issue an interim Certificate of Payment. Payment shall only be affected for actual permanent work completed.

3.22 Payment

Payment to the Contractor shall be affected as follows:

a) 20% deposit on the value of the contract against an advance payment guarantee.
b) 60% of the value of work successfully carried in interim payments as approved by the Engineer.
c) 10% upon final completion of the works and after certification by the Engineer.
d) 10% upon certification by the Engineer that the whole of the installation and equipment has successfully completed the defects liability period of twelve calendar months uninterrupted satisfactory operation.

All payments shall be made within 30 days of the issue of the respective certificate by the Engineer.

3.23 Payment beyond contract sum

The Contractor shall not receive payment beyond the contract sum for any work for which he may consider that payments should be made as an extra, unless such work shall have been ordered as extra work in writing, or unless the Contractor, before commencing such work, shall have claimed in writing that it should be paid for as an extra, and the Engineer shall have certified in writing that the claim is reasonable and proper.

3.24 Partial Completion

If at any time before practical completion of the whole of the works the Employer shall require to take possession of any part of the works, he shall be allowed to do so with the Contractor's consent. As part or whole of the works may be certified by the Engineer, the defects liability period will commence from that date.

3.25 Arbitration

Any dispute, controversy or claim arising out of or relating to this contract, or the breach, termination or invalidity thereof, shall be settled by arbitration in accordance with the rules of the Malta Arbitration Centre as at present in force. Any reference in the General Conditions to other arbitration procedures shall not apply.

4.0 INSTRUCTIONS TO TENDERERS

4.1 General

It shall be the Tenderer's responsibility to acquaint himself with the site before submitting this tender. No claims shall be accepted nor compensation given to the Tenderer nor shall the Tenderer disclaim responsibility resulting from not visiting the site.

The Employer does not bind himself to accept the lowest or any Tender nor to give reasons for rejection of any or all tenders.

The Employer reserves the right to accept any part of the tender and/or award different parts of the Tender to two or more different Tenderers. In case of more than one contractor, each contractor shall accept to liaison in detail with the other contractor.

Individual price entries in the Bill of Quantities may be examined separately and if found to be inconsistent may lead to disqualification of the tender.

Should the Employer, due to circumstances beyond his control, be forced, either to stop the work or reduce the size of the project, the employer reserves the right to cancel from the contractor's contract works in that part of the project that he was forced to stop or reduce.

The Contractor will be only compensated at cost for the equipment and material already on site, or which have already left the manufacturer's or supplier's work.

4.2 Qualification of Tenderer

To be qualified for award of this Contract, Tenderers are to provide evidence satisfactory to the Employer clearly demonstrating their capability and adequacy of resources to carry out this Contract in the stipulated period of time and according to the Tender Specifications.

In this regard Tenderers are requested to fill in the Company Information Sheet when submitting their priced tenders.

Tenderers are to supply a labour forecast graph showing how the manpower on Site will fluctuate during the duration of the Works. The graph shall be prepared on a week on week basis and include enough detail to differentiate between the various trades to be awarded under this Tender.

4.3 Preparation of Tenders

The tenderer shall bear all the costs for the preparation of this tender offer and the Employer shall not be responsible for or pay any expenses or losses which may be incurred by any tenderer in the preparation of this tender.

The Tenderer shall fill in all rates and prices for all items of the Works described in the Bills of Quantity. Items against which no rate or price is entered by the Tenderer will not be paid for when executed and shall be deemed covered by other rates and prices.

No alteration is to be done to this tender document. Any correction in the priced document to an entry by the Tenderer shall be initialled by the same Tenderer. All entries must be in ink.

The Tenderer must fill all entries in the tender document. Failure to fill all entries or to supply information where specifically requested, may lead to disqualification.

The Tenderer is required to initial each page of the submitted Tender Documents thus verifying that the page has been "Read and Approved and Good for Agreement".

4.4 Tendered Rates to be Inclusive

The tendered rates shall be inclusive of all works as specified as well as any other works which are of a contingent or indispensable nature for completing the work in its entirety and to the satisfaction of the Architect in Charge.

The tendered rates shall be inclusive of all materials necessary, profits, VAT duties, levies, customs duties, and landing charges on any imported goods as applicable at the closing date of tendering. The rates are also to include the transport of all items of work to the site and delivery to the required floor on completion.

4.5 Tendered Rates to be Fixed

The tendered rates shall be fixed for a period of two years and no allowances shall be made for fluctuations in rates and prices or for any increase or decrease in the costs of labour and/or materials.

4.6 Submission of Tenders

All tenders shall be submitted in ***duplicate form***, one document marked as ***original*** and the other marked as ***copy***. The tender document shall comprise the following:

Tender Form

Company Information Sheet
Insurance Declaration
Contract conditions
Instructions to Tenderers
Technical specifications
Priced Bills of Quantities
Program of works
Technical Literature (organized in the same order as the bill of quantities).

Tenderers shall submit also, together with the Documents already mentioned, supporting documentation of all the equipment and material they are offering

according to the priced entries in the Bill of Quantities. This documentation shall include specifications of a technical nature, standards to which the material or equipment conforms, manufacturer, model number, construction, etc. in order to enable the Engineer to evaluate conformity to the specifications in this document.

The Tenderer shall also indicate any deviations from the specifications in a covering letter.

Failure of any Tenderer to comply with these requirements shall constitute sufficient grounds for the disqualification of the respective offer.

4.7 Tenders to be sealed prior to Deposition

Tenders submissions are to be sent by email, or similar electronics communications methods, to Galea Curmi Engineering Consultants Ltd.

4.8 Extension of Deadline

The Employer may at its discretion extend the deadline for submissions of Tenders by issuing an amendment in accordance.

In this eventuality, all the rights and obligations of the Employer and the Tenderers previously subject to the original deadline will be subject to the revised deadline.

4.9 Late Submissions

Any Tender received by the employer after the deadline for submissions of Tenders will not be considered.

4.10 Tenders Validity

Tenders submitted in conjunction with this Contract shall remain valid for a period of 3 months after the date of Tender opening.

4.11 Opening of Tenders

The Employer shall open the Tender submissions in private.

4.12 Discrepancies

Tenderers shall promptly notify the Employer of any ambiguity in or discrepancy between any of the Tender Documents which they may discover upon examination of the Tender Documents.

4.13 Clarifications and addenda

Tenderers requiring clarification or interpretations of the Tender Documents shall make a written request which shall reach the office at least ten (10) calendar days prior to the date of closing date of Tenders. Any request after this date will not be accepted.

Any interpretations, corrections, changes or clarifications to the Tender Documents by the Employer will be made by an official addendum. Interpretations, corrections or changes made in any other manner will not be valid, and Tenderers shall not rely upon such interpretations, corrections and changes.

Any Addenda will be faxed, mailed, electronically mailed or delivered to all that are known by the Employer to have received a complete set of Tender Documents. For this purpose, it is in the interest of all Tenderers to have their name and address registered when withdrawing the Tender Documents. No responsibility will be taken by the Employer if Tenderer fails to do so.

No addenda will be issued later than six (6) calendar days prior to the closing date of Tenders except an addendum postponing the date for receipt of Tenders or withdrawing the request for tenders.

Each Tenderer shall ascertain, prior to submitting his Tender, that he has received all addenda issued and shall acknowledge their receipt in his Tender.

Requests for clarifications or interpretations of the Tender Documents shall be communicated by email to Galea Curmi Engineering Consultants Ltd, on info@galeacurmi.com

5.0 TENDER EVALUATION AND AWARD

5.1 Evaluation of Tenders

The Employer will evaluate and compare only those Tenders which have been duly filled and submitted in accordance to the Conditions and Specifications as detailed in these Tender Documents.

5.2 Clarification of Tender Items

The Employer may, at his discretion, ask any Tenderer to clarify items of his Tender including breakdown of rates.

5.3 Confidentiality

Information relating to the Tender evaluation process shall not be disclosed to Tenderers or any other persons not officially involved in the award of the Contract until the successful Tenderer has been announced.

5.4 Award of Contract

The Employer reserves the right to accept or reject any Tender and to annul the Tendering process and reject all Tenders at any time prior to the award of the Contract without incurring any liability to the affected Tenderers or any obligations to inform the affected Tenderers of the grounds for the Employer's decision.

5.5 Letter of Acceptance

The Employer will notify the successful Tenderer by a “Letter of Acceptance” that his Tender has been accepted.

The Letter of Acceptance shall name the rates at which the Employer will pay the Contractor for any work carried out under this contract. The contractor shall receive the Letter of Acceptance prior to the expiring of the Tender Validity period.

5.6 Insurance Policy

The successful Tenderer shall within one week from receiving the Letter of Acceptance furnish the Employer evidence of an Insurance Policy covering the following:

(i) Insurance against Accident to Workmen:
Such insurance shall be maintained during the whole of the time that any persons are employed by him on the works. Provided that, in respect of any persons employed by any Sub-Contractor, the Contractors obligations to insure under this sub clause shall be satisfied if the Sub-Contractor shall have insured against the liability in respect of such persons.

(ii) Insurance against Damage to person and property: indemnifying the Employer against all losses and claims in respect of death of or injury to any person, or loss of or damage to any property (other than the works) which may arise out of or in consequence of the execution and completion of the works, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in relation to the works.

(iii) Third Party Insurance:
Against liabilities for death of or injury to any person, or loss of or damage to any property (other than the works) arising out of the performance of the Contract.

Failure of the successful Tenderer to comply with this requirement shall constitute sufficient grounds for the annulment of the Award.

The Contractor is to contribute towards a 'Contractors All Risk Insurance Premium' at a rate of €2 per €1000. The respective amount will be deducted on each payment offered.

5.7 Performance Bond

The Contractor shall produce an unconditional Performance Bond guarantee of 5% of the Contract price within forty-eight (48) hours from signing of contract. The Bond shall be produced by a local prime bank and shall be free from interest and payable in cash upon the first request by the Employer without any rights to delay, oppose or stop payment on the part of the 'contractor or any of his representatives whatsoever. The guarantee shall be valid until the engineer certifies the final completion of works. (See enclosed Specimen form – Annex A)

5.8 Assignment and Sub-Letting

The Contractor shall not assign or sub-let the contract or any part thereof without the written consent of the Employer. Any such consent, if granted, shall not relieve the Contractor from any liability or obligation under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor.

6.0 CONTRACTOR'S OBLIGATIONS - HEALTH AND SAFETY

6.1 Occupational Health and Safety

The contractor shall assume full responsibility and accountability regarding the health and safety of his/her employees and/or sub-contractors including any third parties involved in the execution of this contract.
The contractor shall be bound to conform with Act VII of 1994. (Promotion of Occupational Health and Safety) as well as any other national legislation, regulations, standards, and/or codes of practice, in effect during the execution of the contract, regarding health and safety issues, as they apply for the contractor's particular operating situation and nature of work activities.

6.2 Compliance with Law

The Contractor shall comply with and fulfil all obligations imposed by Art 19 of the Police Laws and shall give all notices, obtain all permits, pay all fees that may be lawfully demanded by Public Officers in respect of works and comply with all requirements of the Law and any Lawful Authority.

6.3 Standard Technical Regulation

The installation/s shall comply with all relevant statutory Laws and Regulations current at the date of Tender (unless otherwise indicated) and in particular with the following:

a) The British I.E.T. Regulation for the Electrical Installations and Equipment for Public Buildings
b) Any special Regulation issued by the Enemalta Corporation
c) All relevant Safety Regulations.

6.4 Compliance with British & VDE Standards

The equipment and installation shall comply with all the relevant British & VDE Standards Specifications. The Tenderers are, however, at liberty to offer equipment manufactured to other equivalent authoritative standards appropriate to the country of origin, provided that such alternative Standard is at least equal to the respective British Standard.

6.5 Care of Existing Buildings

The Contractor shall take all steps to protect the building and any adjoining property. Every reasonable precaution is to be taken when delivering the work to site, to avoid any damage or injury to property or persons.
Any damages to the building fabric caused by the contracting firm when delivering the finished goods to site will be borne by the contractor.

6.6 Accidents and Risks

The Contractor shall take responsibility for all risks of accident or damage to the work from whatever cause arising, and shall be responsible for the sufficiency of all means by him for the fulfilment of the contract and shall not be relieved from such responsibility by any approval other than a written approval issued by the Engineer in Charge.

7.0 CONTRACTOR'S OBLIGATIONS - QUALITY CONTROL

7.1 Verification of Data

The Contractor shall be responsible for the actual material quantities required. This includes all required equipment, piping, conduit, cable, cable trunking, fittings, etc. required for the complete working installation. No compensation whatsoever will be given to the Contractor for any extra material required to complete the installation due to non-observance of this condition.

As far as possible, the Drawings, Specifications and Bills of Quantities detail the whole of the requirements for the electrical, mechanical, low voltage and air conditioning services for this project. The Tenderer, however, must satisfy himself that the drawings, specifications and bills of quantities do include all necessary materials/equipment etc. for the correct and proper operation of the various services, and ***no extra cost will be allowed once the Contract is let for any omission in this respect***.

7.2 Access to Site and/or Workshops

The Engineer or any person authorized by him or his representative shall have at all times access to the site/workshop where the masonry elements and items are being manufactured and stored.

7.3 Cleaning of Site on Completion

On completion of the works the Contractor shall clear away and remove from the site such materials and leave the whole of the site and the works clean to the satisfaction of the Engineer in Charge.

7.4 Quality Controller

The Contractor shall nominate one qualified technical representative who shall direct all the works and be responsible for the manufacturing, finishing and delivery of all the items of work.

7.5 Inspections and Testing

The Engineer and or his representative shall be given facilities for the inspection of all works in progress whether in workshops or on site. All expenses incurred in testing any of the items shall be borne by the contractor.

8.0 CONTRACTOR'S OBLIGATIONS - WORKMANSHIP

8.1 General Responsibility of the Contractor

All materials and methods of work shall be in the form and nature as specified herein and as indicated in these Tender Documents and Specifications.

8.2 Labour

The Contractor shall be responsible for employing technically competent labour for proper execution and completion of the work within the agreed period of time.

The Contractor shall be responsible for employing labour, as well as overheads, covering all labour costs during the execution of the works as well as the guarantee period.

The Contractor shall also employ labour for any overtime required in order to complete the work within the agreed period of time.

The Tenderer has to enclose with his Tender his proposed planned method of execution, a preliminary Programme of Works, and his proposed Labour distribution chart, covering the period of execution, bearing in mind that the Employer may operate a training scheme for his maintenance workers during the last stages of the Contract for the approval/ modification of such Programme by the Engineer/Employer.

8.3 Dismissal of workmen

The Contractor, on the request of the Engineer, Architect or Employer, shall dismiss forthwith any person or persons employed by him, who may in their opinion misconduct himself or be incompetent.

8.4 Site Organisation

The Contractor shall, during the progress of the works, keep on site a competent foreman. Any instructions given to him by the Engineer shall be deemed to have been issued to the Contractor. The foreman shall not be removed from the site without the prior written approval of the Engineer.

8.5 Cleaning of site

The Contractor shall be responsible for regular cleaning up of the site from any accumulation of dirt and waste material produced as a result of the work in progress. Upon completion of the works, the Contractor shall clean up and leave the site in an orderly fashion to the satisfaction of the Engineer and Employer.

8.6 Co-operation with other trades.

The contractor shall carry out the work in such a manner that will provide full co-operation with other trades employed on the site. Furthermore, he is to ensure that his program of works fits with that of the other trades and that he will not cause any delays to the other trades due to his program of works.

8.7 Materials and Workmanship

All equipment, materials and workmanship to be provided by the Contractor are to be the best of their respective kinds and free from defects. The Contractor will be entirely responsible for the proper and efficient carrying out of the whole of the work which is to be done in the best workmanlike manner.

8.8 Measuring of Site

The Contractor shall be responsible for actual material quantities required. This includes, all required piping, conduit, cable, cable trunking, fittings, etc. required for the complete working installation. No compensation whatsoever will be given to the Contractor for any extra material required to complete the installation due to non-observance of this Condition.

8.9 Samples

The Engineer in charge may, before or during the execution of works, request additional samples from the contractor. Such samples or any materials requested shall be approved by the Engineer in Charge before the relative orders for supply are placed. All costs of testing and provision of samples to be borne by the Contractor. Once approved, it is the Contractor's responsibility to ensure that the works and materials comply with the samples submitted.

8.10 Type Approvals

Once the Contract is let, the Contractor shall prepare 'Submittal Data' of all the equipment and materials to be purchased for and obtain Type Approval of same in writing prior to the actual ordering. Any material or equipment ordered prior receiving the Type Approval would be at full responsibility of the Contractor who will have no recourse if such Type Approval is not given. The submittal data shall include as applicable the following details, which shall be supplied in quadruplets:

a) Technical Leaflets
b) Drawings
c) Performance Characteristics
d) Manufacturing Standards
e) Name of Manufacturer/Supplier

8.11 Testing of Materials

The Contractor shall provide without extra charge, all labour and equipment required by the Engineer in Charge for testing and measuring the works and

weighing, measuring, or testing the efficiency or any portion or portions of the completed work.

8.12 Bad Workmanship

The Engineer in Charge shall, during the progress of the works, have the power to order:

a) the removal within such reasonable time or times as may be specified in the order, of any materials or equipment which is in his opinion are not in accordance with the specifications or his instructions;
b) the substitution by proper material or equipment;
c) the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the method statement, drawings, specifications or instructions,

and the Contractor shall forthwith carry out such order at his own cost. In case of default on the part of the Contractor to carry out such order, the Engineer in Charge shall have the power to employ and pay other persons to carry out such work, and all expenses consequent thereon or incidental hereto shall be borne by the Contractor and shall be recoverable from him or may be deducted from any moneys due or that may become due to him.

9.0 CONTRACTOR'S OBLIGATIONS – COMMISSIONING, TESTING AND DOCUMENTATION

9.1 Commissioning and testing

On completion of works, full-scale tests shall be carried out by the Contractor to demonstrate the performance of the installation/s to the Engineer's satisfaction.

Full scale testing (and/or partial) shall be executed on the request of the engineer at any time he thinks fit, provided that the contractor is informed 3 days in advance. In addition, the contractor must be responsible for the electrical installation to be accepted by the Enemalta testers.

Imperative that the contractor shall execute all necessary testing, provide all adequate instruments and labour attendance for all services concerned, excluding that executed by Enemalta.

The relevant electrical test shall be: -

a) Insulation resistance test by a 600volts megger (i) between conductor and (ii) between conductors and earth.

b) Earth continuity resistance test

c) Polarity test at all sockets outlets and switches

d) Hydraulic pressure test using hydraulic pressure pump. The project's Engineer must be informed at least 48 hours in advance of the date and time such tests are to be effected, thereby the Engineer shall be present. Hence, the Engineer reserves the right to demand a copy of the tests' results certificate.

9.2 Take-Over Inspection

The Contractor shall advise the Engineer of a suitable date for the final inspection.

The installation will not be considered ready for final inspection unless the following items are completed: -

a) All boards, switchgears, outlets, etc., have been cleaned.
b) All lamps are on site and working.
c) All tests have been carried out and records of these tests produced. The engineer may then call for any or all of the tests to be repeated in his presence to verify the recorded results.
d) All labelling is completed.
e) All trunking and conduit lids secured.
f) All unused conduit holes blanked off
g) All M.I.C.S. glands, flexible conduit couplings, etc., have been tightened.

9.3 Operating and maintenance instructions

On completion of all works and prior to handing over, the Contractor shall provide two copies of the complete set of operating and maintenance manual comprising of the following:

a) General description of the installation, indicating the manner of working of each system, forming part of the works.
b) Full instructions for starting up, operating and shutting down each individual assembly of equipment.
c) Instructions as to the frequency and full requirements of routine and regular preventive maintenance necessary to maintain the equipment in a good working condition. This information is to be supplemented by the Manufacturer's Maintenance Instructions for all equipment.
d) A recommended spare parts list including current price of each part, the manufacturer's address and local stockist/agent.
e) Wiring diagram of the system and equipment.
f) Three sets of "as fitted" drawings and one soft copy.

10.0 OTHER CONDITIONS

10.1 Miscellaneous

The Contractor shall be entitled to use (and be charged) such supplies of electricity and water as may be available on the site for the purpose of the works and shall, at his own expense, provide any apparatus necessary for such use.

No plant shall be delivered to the site until authority in writing has been applied for and obtained by the contractor from the Architect that the Site is ready to provide access.

If the Contractor shall neglect to execute the works with due diligence and expedition according to the works programme, or shall refuse or neglect to comply with any reasonable orders given to him by the Architect in connection with the works, or shall contravene the provisions of the Contract, the Client, or the Architect, on his behalf may give seven days' notice in writing to the Contractor to make good the failure, neglect or contravention complained of. Should the Contractor fail to comply with the notice within seven days from the date of service thereof, then the Client shall be at liberty to employ other workmen and forthwith execute such part of the works as the Contractor may have neglected to do, or if the Client shall think fit, it shall be lawful for him, without prejudice to any other rights he may have under the Contract, to take the works wholly or in part out of the Contractor's hands and re-contract with any other person or persons to complete the works or part thereof. In that event, the Client shall have the free use of all tools, stores and other things that may be at that time on site in connection with the works, without being responsible to the Contractor over the same, and the Client shall be entitled to retain and apply any balance which may be otherwise due on the contract by him to the Contractor, or such part thereof as may be necessary to the payment of the cost of executing the said part of the Works or of completing the Works as the case may be. If the costs of completing the Works or of executing a part thereof as aforesaid shall exceed the balance due to the contractor, then the latter shall pay such expense.

Annex A

FORM OF PERFORMANCE BOND

(name & address of principle)

Date ……

Dear Sir,

OUR GUARANTEE NO: FOR ACCOUNT –

In connection with the agreement entered into between …….. and.……. ……. …… and ……. of ……..
(referred to as the contractor) as per latter's tender dated ……..
and your acceptance of …….. whereby the Contractor undertook ……, we, …….. hereby guarantee to pay you on demand a maximum sum of …… Euro in case the obligations under the above mentioned agreement are not duly performed by the Contractor.

It is understood that this guarantee will become payable on your first demand and that is shall not be incumbent upon us to verify whether such demand is justified.

This guarantee expires on the _____ and unless it is extended by us or returned by us for cancellation before that date any demand made by you for payment must be received at this Office in writing not later than the aforementioned expiry date.

This document should be returned to us on utilization or expiry and in the event of the guarantee being no longer required.

After the expiry date and in the absence of a written demand being received by us before such expiry date, this guarantee shall be null and void, whether returned to us or not, and our liability hereunder shall terminate.

This guarantee is personal to you and is not assignable.

Yours faithfully,

_____
Manager

_____
Countersigned

Specifications for the Installation of Mechanical Services

INSTALLATION

A.1. General

Except where otherwise stated, workmanship shall comply with British Standard Codes of Practice where applicable. It shall be of the highest standard throughout. The contractor shall ensure that the standard of finish demanded by this contract is achieved. Branded materials shall be assembled, constructed and joined in accordance with the manufacturer's instructions and recommendations.

A.2. Outdoor Unit/s

The outdoor unit/s shall be installed, supported and adequately isolated, so that no vibration transmission shall occur between it and the structure. Suppliers' recommended working clearances shall be strictly adhered to. The contractor shall include any civil works in connection with the outdoor unit and any related equipment such as plinths or the inclusion of RSJ's to support the equipment. The exact location shall be as instructed by the client.

A.3. Refrigerant Pipes

A.3.1 When installing copper pipes, proper measures shall be taken to prevent the tubes from getting contaminated or moistened. During brazing, nitrogen gas must be passed to prevent oxidation. The end of each length of pipe shall be covered. Special care shall be taken to avoid the ingress of dirt when passing copper pipes through a hole. Before carrying out a thorough vacuum operation the copper pipe system shall be flushed systematically as recommended by the manufacturer with nitrogen. This operation shall be carried out on both liquid and gas pipes. Also, before the vacuum operation an ‘airtight test’ shall be carried out. This should be done in steps in order to eliminate major leaks. Pressure should be increased up to a maximum value as indicated by the manufacturer and kept for 24 hours.

A.3.2 Pipes shall be securely bracketed at intervals according to the manufacturer’s instructions. All pipe work shall be supported by means of split-type galvanized steel brackets, incorporating a rubber insertion around the whole of the circumference. The bracket itself shall be supported by a single stud, bolted to a proprietary galvanized steel U channel which shall allow the stud to slide sideways during installation, and thereby achieve a neat finish. For horizontal runs at roof level, the U channel sections shall be anchored down to specifically made concrete slabs laid on the roof. The cost of slabs and U channel brackets shall be deemed to have been included in the tendered rate for the pipes.

A.4. Drains

A.4.1 Drain pipes shall be properly joined in accordance with the manufacturer's recommendations and slope downstream at a gradient of 1:100 and not less than 1:250. Access through screw caps shall be installed at strategic points in case of pipe blocking. Hanging bars/supports shall be installed every 1 to 1.5m so that drain pipes will be adequately supported without kinks. After the completing the drain system, this shall be checked for any leaks and that water flows freely. Also, the drain pump of each indoor unit shall be checked to see that it functions properly.

A.4.2 Under no circumstances shall joints in pipes (PVC and copper) be made in the thickness of walls, floors or ceilings. Pipes shall not be embedded in walls or floors unless specifically directed.

A.5. Pipe Insulation

Insulation shall be applied in such a manner that air circulation between it and the pipe shall be avoided. It shall only be applied after the pipes have been pressure tested to the satisfaction of the Engineer.

A.6. Civil Works

fthrough walls. Holes shall be neatly prepared and to the size suitable for the fan, duct or pipe being fitted. Oversize holes shall be neatly finished following the equipment installation. This shall include drilling of holes through walls, floors and ceilings, chasing if and when required, sealing and making good of all unused openings and penetrations made during erection of system, and support of equipment including the installation of RSJ's if required. Civil work shall include necessary penetration/s, coring and/or openings in any RC slabs and/or xorok, (franka) masonry and HCB walls within any applicable area/level of the site, including but not limited to the removal, reinstatement, replacement of any xorok and modifications to any underlying beams, temporary propping and/or scaffolding to carry out such works, required making good in accordance with acoustic and fire safety requirements.

A.7. Painting

All rusted metal surfaces shall be wire-brushed down to bare metal and shall not be painted prior to the approval of the Engineer. All painted surfaces which are meant to remain exposed, shall be given a coat of primer and two final coats of high gloss enamel paint of approved colour. All galvanised metal surfaces shall be given adequate coats of etching primer and two final coats of high gloss enamel paint of an approved colour.

A.8. Electrical Works

A.8.1 Electrical works carried out in connection with the above detailed works shall be strictly in accordance with the latest edition of the I.E.T. and Enemalta regulations. This shall include power factor correction where necessary.

A.8.2 The electrical supply to the various equipment shall be provided near each unit but the contractor shall be responsible for connecting up the equipment to this available supply which shall be suitably terminated. The contractor shall also connect up the units to their controllers which shall be positioned as indicated on drawings. This may require chasing and installation of conduit and any necessary fittings.

A.9. Fixing to the Building Structure

A.9.1 Light fixings to brick, concrete or other masonry materials shall be by correctly sized screws fitted into plastic or metal expanding plugs located in correctly sized holes drilled in the structure. Light fittings to cavity constructions shall be gravity or spring toggles, or expanding rubber sleeve fitted on to screws.

A.9.2 All holes shall be carefully drilled by slow speed rotary drills as recommended by the manufacturer of the fixing devices. Percussion type boring devices and shot fired fixings shall not be used without prior approval in writing by the Site Project Manager.

A.9.3 Where fittings to steelworks are required, they shall be by the use of metal clamps/hook bolts or similar devices where the method of fixing does not require any drilling or cutting of the steelworks. Under no circumstances should structural steelworks be cut or drilled.

A.9.4 In all cases, the particular type and size of fixing devise used shall be in accordance with the manufacturers' recommendations having regard to the application and the load to be carried by the fixing device.

A.9.5 Any drilling and making of screwed or bolted fixings to the structure shall be included in the tender. Proposals for fixings shall be discussed with and approved by the Engineer and any possible restrictions shall be ascertained before submission of the tender.

A.10. Testing and Commissioning

A.10.1 All commissioning and testing shall be carried out in accordance with CIBSE commissioning Code Series A to the full satisfaction of the site Engineer.

A.10.2 The Contractor shall be responsible to provide all test points, test instruments and any related equipment for carrying out such tests, even if such requirements are not detailed and specified elsewhere on these documents.

A.10.3 The Contractor shall provide the Engineer with all certified performance characteristics and test data for all of the functional equipment.

A.10.4 Under no circumstances shall piping be buried or insulated before tests have been carried out to the satisfaction of the Engineer and before the Engineer has authorised the contractor to do so.

A.11. Record Drawings and Manuals

A.11.1 The contractor shall provide drawings to the scales not less than those used for tendering purposes. These drawings shall show plans and such sections as the engineer may consider necessary to show all required information clearly.

A.11.2 All the foregoing drawings shall be specially prepared and the final copies shall consist of one negative and three prints of each drawing. The final 'as fitted' drawings shall be submitted to the engineer within three weeks from the date of handing over of the installation.

A.11.3 Technical manuals for each item of equipment shall be submitted to the Engineer together with the drawings and at the same time. These shall be comprehensive and shall include spares ordering information. Sales brochures shall not be accepted in this respect.

A.12 Maintenance

The tender shall include **full and comprehensive maintenance** of the new variable refrigerant volume/flow system for the duration of the guarantee period or 24 months from commissioning. A detailed maintenance agreement shall be submitted with the offer. A log book shall also be kept by the client listing critical values of readings taken during each maintenance visit. Detailed maintenance procedures shall be listed in the agreement.

1 TECHNICAL SPECIFICATIONS FOR AIR CONDITIONING SYSTEM

1.1 Scope of Work

Air conditioning in the OASI Foundation premises shall be by means of packaged variable refrigerant flow/volume systems incorporating ceiling cassette type, high wall mounted and ceiling suspended indoor units. The air conditioning system shall be capable of absorbing the heat gains from the building structure, occupants and other sources present within the area in order to maintain the conditions of 24 deg. C. D.B. when operating at an external ambient temperature of 35 deg. C. D.B. **The manufacturer's literature supplied with the offer shall clearly state that the units shall remain operational for long period without tripping when the ambient temperature reaches 43 deg. C.**

Tenderers are requested to note the building layout and the location of the indoor and outdoor units. The current indoor and outdoor units shall be carted away; however, the existing copper pipework and drains are to be re-utilised. It is being suggested that a site visit is set to familiarise themselves with the existing installation. They shall confirm that the indoor units as connected to the outdoor unit will operate efficiently. Moreover, it is to be ensured that the equipment offered is suitable to operate within the physical restrictions of the building layout in terms of pipe lengths and difference in levels between the outdoor and indoor units.

1.2 Submittals

Prior to acceptance of the proposed system and equipment, the Contractor shall submit together with his quotation a description of the equipment and its components as offered together with all relevant manufacturer's catalogues, illustrations and diagrams. All relevant technical and descriptive literature shall be in English. Literature shall be supplied for the following:

- VRF outdoor units
- VRF indoor units
- Refrigerant pipes including support brackets
- U-PVC drain pipework
- Pipework insulation including UV Protection
- Central controller
- LCD wired controllers

All equipment and installation shall be guaranteed for a minimum period of 24 months against faulty workmanship and materials. If during this period any parts or equipment have to be changed, the guarantee on that part shall be renewed for another year from date of replacement.

The energy label as regards Council Directive 92/75/EEC for each air conditioning unit shall be included with the technical literature. Units which are not Class A rated shall not be accepted.

1.3 Specification

This specification details the requirements for the provision, installation and commissioning of Variable Refrigerant Volume/Flow type systems supplying room indoor units. These shall be of the air cooled, heat pump packaged multi-system type and shall be suitably protected for external application.

It is expected that these plants be highly reliable and that all equipment shall operate with maximum quietness as well as to maintain the required conditions automatically.

Outdoor units shall be weather protected and suitably coated against corrosion with a finish best suited for the local climate.

Works also include the supply and installation of:

- The air conditioning equipment including outdoor and indoor units and any ancillary equipment required for a complete installation.
- The piping system including fittings, valves, insulation, drains, etc. for a complete piping and drain system.
- Testing and commissioning of the complete air conditioning systems.

Related works detailed in the specification include:

- Drilling of holes through walls and floors and chasing where required for the passage of copper pipes and drains.
- Making good of any holes to the outside of the building so as to render these weatherproof.
- Civil works including the supply and installation of RSJ's for outdoor plant and equipment

Air Conditioning Equipment

1.4 Energy Efficiency

The energy label as regards Council Directive 92/75/EEC for each air conditioning unit shall be included with the technical literature. Preference shall be given to those products which run more efficient on cooling and heating modes.

1.5 Outdoor Units

The outdoor unit shall be factory assembled housed in a galvanised sturdy steel casing coated in a baked enamel finish or acrylic paint. It shall be of the packaged direct expansion heat pump multi-system type. This unit shall be of the top flow configuration, drawing air in from the sides and discharging hot air to the top. It shall include any sound absorbing material and vibration eliminators required to ensure that the overall noise level of the unit is within the specified limit and that no vibration is transmitted to the building structure.

It shall be possible to connect at different type and capacity, individually controlled indoor units to one refrigerant circuit.

Cooling Capacity: The required cooling capacity for the individual systems shall be obtained by using one or more units as necessary. If more than one unit is used to obtain the required cooling capacity, then they must be connected together so that only one set of risers are required.

Power Supply	: 400V 3-phase 50Hz
Refrigerant	: R410A
Max. Noise level	: 63 dB (A) at 1m

The **compressors** shall be of the highly efficient hermetic scroll type mounted on vibration absorbing material. They shall be equipped with a thermal protection device. The units shall be designed to operate utilising one compressor when the other is out of order. They shall be equipped with inverter control capable of changing the speed in accordance with the cooling or heating load requirement. Other types of compressors may be accepted if they are equivalent or superior to those specified. If so, full descriptive and technical literature shall be supplied to support this deviation.

The **heat exchanger** shall be constructed with seamless copper tubes mechanically bonded to aluminium fins. The entire assembly shall be treated with a suitable protective coating against saline environments.

Fan/s shall be direct driven propeller blade type with external protective wire guard. The fan motors shall include a thermal protection device. They shall be resiliently mounted to avoid vibration transmission.

The **refrigerant circuits** shall be of copper tubing and shall include an accumulator, liquid and gas shutoff valves and a solenoid valve. All necessary safety devices shall be provided to ensure the safe operation of the system. The refrigerant system shall be factory charged with R410A and refrigerant oil and shall include a charging valve.

An **Oil Recovery System** shall be incorporated into each unit to ensure stable operation with long refrigerant piping.

The following **Safety Devices** shall be incorporated in each outdoor unit:

Supply Power

- Phase failure protection
- Phase reversal protection
- Over and under voltage protection
- Voltage difference between phases protection

Compressor

- Safety Thermostat
- Crank case Heater
- Over current protector for the inverter

Other Safety Devices

- Fan Motor Thermostat
- High pressure switch
- Fusible Plug
- Short recycling guard timer
- Inverter Fin Thermal
- Over Current Protector for Inverter
- PC Board Fuse

The following sensors shall also be included to make available the indicated parameters.

- High Pressure Sensor
- Low Pressure Sensor
- Thermistor for Outdoor Air
- Thermistor for heat Exchange
- Thermistor for Discharge Pipe
- Thermistor for Suction Pipe

1.6 Indoor Units

The indoor units shall be:

- Ceiling Suspended type
- High Wall Mounted type
- Four Way Soffit Cassette type

The cooling capacity for the units shall be quoted at medium fan setting. They shall be equipped with a three speed fan possibility for low, medium and high speeds. Each unit shall be equipped with a wired controller. The unit shall come complete with automatic drain pipe system.

In the case of the soffit cassette type indoor units, automatic discharge deflection grilles shall be provided on the air outlet to allow for directional control. These shall swing automatically to ensure an even distribution or else they may be set in a fixed position. Inlet grilles shall be fixed direction. These shall be made of high temperature resistant thermoplastic and shall not warp with prolonged use.

The overall size of the soffit cassette unit shall be 600x600mm with capacity of 4.5kW and smaller. The cooling capacity for the units shall be quoted at medium fan setting. All units shall have a low profile and an attractive and aesthetically pleasing design. They shall be equipped with a three-speed fan possibility for low, medium and high speeds. Each unit shall be equipped with wired remote control and a condensate pump.

In case of high wall mounted and ceiling suspended type indoor units, each unit shall be equipped with a condensate pump. The cooling capacity for the units shall be quoted at medium fan setting.
Units shall have a low profile and an attractive and aesthetically pleasing design. They shall be equipped with a three-speed fan possibility for low, medium and high speeds.

Discharge deflection grilles shall be provided on the air outlet to allow for directional control. These shall swing automatically to ensure an even distribution. Inlet grilles can be fixed direction. The grilles shall be made of high temperature resistant thermoplastic and shall not warp with prolonged use.

Each unit shall include an electronic control valve to regulate the flow of refrigerant to the unit according to the load variations of the room.

The unit shall have easy access to the following components without the necessity of removal or dismantling:

- Wiring diagram and identification plate
- Terminal strips and electrical connections
- Valves and refrigerant pipe connections
- Blower motor assembly
- Air filter
- Air intake and discharge grilles
- Condensate tray

1.7 Control

1.7.1 Local Controllers

All indoor units in each level shall be grouped and equipped with a wired controller. The temperature sensors for the units shall be housed within the unit itself and not on the remote controller.

Each local remote controller shall at least have the following functions for each indoor unit:

- Unit start/stop
- Operating mode selection
- Fan speed regulation (at least three speeds)
- Temperature regulation
- Timer setting

Each unit remote controller shall at least display the following information:

- The set temperature
- The operating mode
- The fan speed
- Abnormal operation of the unit
- Programmed time

1.7.2 Central Remote Controller

The system shall be equipped with a central remote control station which will enable the controller to program the various settings for the different units comprising the system from a remote location, overriding the local remote controllers. Each Central unit shall be capable of handling the number of connected indoor units.

The following controls shall be available for each indoor unit:

- Unit start/stop
- Operating mode selection
- Fan speed regulation (at least three speeds)
- Temperature regulation
- Timer setting.

The central controller shall also be capable of receiving a signal from the fire alarm panel in case of activation (dry contact). In such a case the VRF central controller shall shut down the respective air conditioning system and a manual reset would be required to resume normal operation.

The central controller must include an on-board gateway for BMS interfacing via an industry standard protocol such as MODBUS, Lon Works or BACNET.

The controller shall be capable of displaying the following information for each indoor unit:

- The set temperature
- The operating mode
- The fan speed
- Abnormal operation of the unit
- Programmed time

1.8 Refrigerant Pipes and Fittings

Pipes connecting the indoor and outdoor units shall be run in de-oxidized phosphorous copper and shall include all necessary branch joints or headers as required to connect the indoor units. Long pipe lengths or coiled pipe should be used to avoid the necessity for frequent soldering. The copper pipe employed should be with insulation coating. All pipes and fittings shall be insulated using closed-cell insulation at least 19mm thick.

Piping design shall be such as to ensure proper operation of the system, even with long pipe lengths. Sizing of pipes shall be carried out by the tenderer, based on the manufacturer's recommendations, bearing in mind the number of indoor units connected to the same outdoor unit, the overall length of pipe and the difference in levels between the indoor and outdoor units. Allowance shall also be made for the addition of other indoor units at a later date so as to make use of the full potential of the outdoor unit cooling capacity.

Copper pipes and fittings shall have brazed joints. Tube ends shall be cut square and all burrs removed prior to cleaning ends for jointing. All pipes shall be blanked off during the course of the installation to prevent the ingress of dirt and other materials which may otherwise block the pipes. The Contractor shall be responsible to comply with this provision under all circumstances.

Pipes shall be securely bracketed at intervals according to the manufacturer's instructions. All pipe work shall be supported by means of split-type galvanized steel brackets, incorporating a rubber insertion around the whole of the circumference. The bracket itself shall be supported by a single stud, bolted to a proprietary galvanized steel U channel which shall allow the stud to slide sideways during installation, and thereby achieve a neat finish. For horizontal runs at roof level, the U channel sections shall be anchored down to

specifically made concrete slabs laid on the roof. The cost of slabs and U channel brackets shall be deemed to have been included in the tendered rate for the pipes.

1.9 Drain Pipes

These shall be run in suitable, UPVC material. Branches shall be kept to a minimum to reduce the risk of blockage. Pipes and fittings shall be bonded together using the manufacturer's recommended adhesive. The necessary inspection and cleaning fittings shall be fitted to permit regular and easy maintenance of the system. All condensate pipes shall be insulated and kept as short as possible, sloping downwards to avoid airlocks. The condensate drains should be appropriately sized. Each unit shall have a 25mm diameter pipe and resizing of the main condensate drain should be made with every 3 consecutive units, connected together.

1.10 Pipe Insulation

The insulation used on refrigerant pipes and on condensate drain pipes shall have a closed cell structure, which is a built-in vapour barrier with a very high resistance to water vapour transmission. The insulation shall have a low thermal conductivity. The insulation shall be rated to Class 1 and shall have an operating range of between 0 and 120 deg. C. and shall be self-extinguishing. It shall have a high resistance to water ingress and have a low toxicity index. The water vapour diffusion resistance factor shall be superior to 5000 (DIN 52615 or equivalent). It must be dust free, fibre free and CFC free with an ODP of zero. Insulation installed outside shall be UV protected. It shall be protected by a minimum of 2 coats of paint as recommended by the manufacturer and must be carried out within the recommended period.

The following characteristics shall be clearly indicated on the manufacturer's literature submitted with the offer:

- Water vapour permeability
- Thermal conductivity
- Fire performance
- UV protection

1.11 Noise and Vibrations

Particular attention shall be given to the internal and external noise generated by the equipment. The selected equipment offered shall observe the noise criteria listed below and any additional sound treatment shall be deemed to have been included in the tender price.

Vibration transmission from the equipment to the building shall be kept to an absolute minimum by means of anti-vibration mountings. All such mountings shall be deemed to have been included in the tender price.

1.12 Galvanized Steel Cable Tray and Fittings

Steel cable tray shall be used on the roof to support the lagged copper pipes running to the outdoor units. This shall be hot dipped galvanized after forming, medium duty return flange unless otherwise specified.

Cable tray shall be adequately supported and shall not deflect more than 6mm between supports. All cables installed on cable trays shall be securely fixed using PVC cable ties. The cable tray installation shall be electrically continuous and bonded to the main earth terminal.

Supports of cable tray installed internally shall be galvanized or primed and painted with 2 coats of zinc-enriched paint. Cable tray running externally (including open-top shafts) shall be mounted on galvanized brackets or channel.

1.13 Builder's Work

The Tenderer is to include in his rates for chasing, holes in reinforced concrete or structural members etc. required for the proper execution of the works. Holes in reinforced concrete or structural members shall only be made after approval by the Engineer or Architect in charge. All holes shall be made good with appropriate material in order to ensure that the integrity of the fire barrier is maintained. Such making good shall be deemed to have been included in the tendered rates.