INDEPENDENT DEVELOPMENT TRUST

IDT - LP–DSAC- RM-AIRCONDITION – 022024

TITLE:

REQUEST FOR QUOTATION FROM MECHANICAL CONTRACTORS TO SUPPLY AND INSTALLATION OF AIR CONDITIONING SYSTEM UNITS IN RUNNYMEDE LIBRARY.

CLOSING DATE 28 February 2024

BIDDER'S INFORMATION

(Must be completed by Bidder)

Company Name	
Contact Person	
CIDB GB GRADING	
Cell / Tel Number	
Fax Number	
E-mail Address	
CSD Number	

Prepared By:

The Independent Development Trust (IDT)
22 Hans van Rensburg
Polokwane
0699

1. TERMS OF REFERENCE

ITEM	DESCRIPTION
1.1 Request for Quotation Issue Date	13 February 2024
1.1.1 Compulsory Briefing	N/A
1.2 Request for Quotation Closing Date	28 February 2024 @12:00pm – No late submissions will be received and/or considered.
1.3 Quote Reference No.	**IDT - LP–DSAC- RM-AIRCONDITIONING SYSTEM – 022024**
1.4 Enquiries	Any queries shall be directed in writing to the IDT and shall be addressed to the contact person/s in the addresses indicated below; **Name:** Mr. Thamsanqa Vilakazi (Technical) **Email:** ThamsanqaV@idt.org.za (08h30 – 17h00 weekdays only) **Name:** Ms. Kgotsofalo Malapane (Bid Administration) **Email:** KgotsofaloM@idt.org.za (08h30 – 17h00 weekdays only) **Please note: Enquiries should reach IDT on or before 26 February 2024**
1.5 Compulsory Requirements	1.5.1 Only bidders who received invitations as per the respective districts will be considered for tendering. 1.5.2 A fully completed and signed Bidder's Disclosure (SBD 4) 1.5.3 Completed Form of Offer, fully signed and witnessed. 1.5.4 COIDA Certificate 1.5.5 Valid CIDB (2ME and above) 1.5.6 A fully completed BOQ **FAILURE TO COMPLY WITH ANY OF THE ABOVE WILL LEAD TO DISQUALIFICATION**
1.6 Evaluation Criteria	1.6.1 The 80/20 Evaluation System will be applicable. 1.6.2 A fully completed and signed Preference Points Claim Form in terms of the Preferential Procurement (SBD 6.1) (No points will be allocated if points are not claimed)
1.7 Bid Award Criteria	1.7.1 The bidder must have a **Compliant Tax Status** 1.7.2 A fully completed and signed Invitation to Bid document (SBD 1) 1.7.3 Failure to comply with items 1.7.1 (tax compliance) and 1.7.2 (SBD 1) within a reasonable period (7 calendar

ITEM	DESCRIPTION
	days) as would be indicated by the IDT, will result in the bidder being non-responsive.
1.8 Conditions of the contract	1.8.1 The contract that will be entered into is JBCC Minor Works Agreement Addition 5.1 published March 2014.
1.9 Submission of Quotation documents	Fee proposal documents shall be **hand delivered** in 1 combined pack *(i.e., Bid document and its accompanying Annexures)* to the *Implementing Agent (IDT),* and shall be marked as follows: **The Independent Development Trust (IDT)** 22 Hans van Rensburg Street Polokwane 0700 **Marked confidential Fee proposal and Indicate the Following:** **IDT - LP–DSAC- RM-AIRCONDITION – 022024** BID BOX IS LOCATED AT THE IDT'S MAIN RECEPTION AREA AS PER THE ADDRESS INDICATED ABOVE
1.10 Pricing / Quotation / Fee Proposal	1.10.1 Fee proposals shall be inclusive of VAT (Where Applicable - VAT Vendors) 1.10.2 Fee proposals shall be valid for **90 calendar days**. 1.10.3 All costs related to the services to be provided shall be included in the fee proposal. 1.10.4 The fee proposal shall be inclusive of all work expenses as there shall be no additional monies that will be paid by the Employer for this project. As such all work-related risks shall be factored in the bidder's fee proposal. Price / Fee adjustments shall only be carried out if and when the construction price changes, as is the norm, and in line with the applicable tariff of applicable professional fees. **1.10.5 Note: Overall discount must be given on the fee proposal (Table 3.1 Item F)**

ITEM	DESCRIPTION
1.11 Amendments	1.11.1 Any amendments to the rates offered or description given must be signed by an authorized person (i.e., who signed the original fee proposal)
1.12 Scope of Works	1.12.1 Supply and Installation of air conditioning systems please refer to Bill of Quantities (BOQ)
1.13 Project Staff	1.13.1 The Service Provider to provide CV of the personnel to be used in the project and attach proof of their relevant qualifications/ professional registration related to the discipline. (Attach organogram) 1.13.2 Such personnel shall be always available for project / site related matters. Should these personnel be changed for some or other reason, he/she should be replaced by a person of equivalent or higher qualification and registration status.
1.14 IDT's Reservation of Rights	1.14.1 IDT's reservation of rights: IDT reserves the right to cancel or withdraw this request for fee proposals without prior notice and without furnishing any reasons whatsoever. 1.14.2 IDT reserves the right to award all or part of the works. If not all works are awarded, the IDT reserves the right to re-calculate the bid price in accordance to the adjusted works (i.e. adjusted construction value). IDT shall only pay for work done / carried out on site. No monies will be paid to the service provider for work stoppages / or when the project is placed on hold. As such the service provider shall only be paid for work carried out on site (refer to clause 1.16.1). 1.14.3 The IDT reserves the right to terminate the appointment at any stage, and the contractor will be entitled to be remunerated only for the work completed before receiving the notice of termination. 1.14.4 The IDT reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the IDT.

ITEM	DESCRIPTION
1.15 Cancellation Cost	1.15.1 Should the project be cancelled by the Client Department, for funding and/or other reasons, the IDT and the Client Department shall not be liable to remunerate the service provider for any potential loss of business and/or profit. The service provider shall only be remunerated for work done prior to the cancellation. 1.15.2 In the case time-based fees and disbursements may be used, where applicable, to remunerate the service provider accordingly. 1.15.3 **Note:** No time-based fees shall be applicable for any work on hold.
1.16 Contract	1.16.1 The service provider will be expected to enter into the JBCC Minor Works Agreement Addition 5.1 published March 2014.
1.17 Bid Document and Contract	1.17.1 The Bidder is advised to ensure that they familiarise themselves with all the contents of the bid documents as those will form the basis of the contract to be entered. Any contents of this document that the bidder requires clarity on shall be brought forward before the bid submission date stipulated in this bid document. 1.17.2 Conditions of Contract are the JBCC Minor Works Agreement Addition 5.1 published March 2014 with IDT addendum provided. 1.17.3 Contract works insurance to be effected by the contractor to the minimum value of the contract sum plus 10%. 1.17.4 Public liability to be effected by the contractor for the sum of R1million.
1.18 CONTRACT SKILLS DEVELOPMENT GOAL (CSDG)	1.18.1 Not applicable

2. PRICING DATA

The fee proposal shall be based on the work to be performed on site by the Service Provider and shall include all relevant allowances for unforeseen risk associated with the work of this nature.

2.1 PRICING INSTRUCTION

2.1.1 The Bills of Quantities have been drawn up in accordance with the Standard System of Measuring Building Work (as amended) published and issued by the Association of South African Quantity Surveyors (Sixth Edition (Revised)), 1999. Where applicable:

2.1.2 Structural and Civil work has been drawn up in accordance with the provisions of the Engineering Council of SANS 10400 Standardized Specifications.

2.1.3 Mechanical work has been drawn up in accordance with the provisions of the Engineering Council of SA Refrigeration, Air-Conditioning and Ventilation Installations.

2.1.4 Electrical work has been drawn up in accordance with the provisions of the Engineering Council for Electrical work.

2.1.5 The agreement is based on the JBCC Minor Works Agreement Addition 5.1 published March 2014. The additions, deletions and alterations to the JBCC Minor Works Agreement as well as the contract specific variable are as stated in the Contract Data.

2.1.6 It will be assumed that prices included in the Bills of Quantities are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards).

2.1.7 There are no drawings listed in the bid document used for the setting up these Bills of Quantities.

2.1.8 Reference to any particular trademark, name, patent, design, type, specific origin or producer is purely to establish a standard for requirements. Products or articles of an equivalent standard may be substituted.

2.1.9 Where any item is not relevant to this specific contract, such item is marked N/A (signifying “not applicable”)

2.1.10 The Contract Data and standard form of contract referenced therein must be studied for the full extend and meaning of each and every clause set out in section 1 (preliminaries) of the Bills of Quantities.

2.1.11 The Bills of Quantities is not intended for the ordering of materials. Any ordering of materials, based on the Bills of Quantities, is at Contractor’s risk.

2.1.12 Bidders must price every item.

2.1.13 Fill the BoQ of the category that you qualify for.

2.1.14 The amount of the preliminaries Section to be included in each monthly payment certificate shall be assessed as an amount as stipulated in the bid documentation.

2.1.15 Where the initial contract period is extended, the preliminaries shall be adjusted as set out in the documentations

2.1.16 The amount or items of the Preliminaries Section shall be adjusted as set out in the documentations.

2.1.17 For the purpose of this Bill of Quantities, the following words shall have the meanings hereby assigned to them:

Unit : The unit of measurement for each of work as defined in the Standardized, Project or Particular specification

Quantity : The number of units of work for each item

Rate : The payment per unit of work at which the Bidder bids to do work

Amount : The quantity of an item multiplied by the bidder rate of the (same) item

Sum : An amount bidded for an item, the extend of which is describe0d in the Bill of Quantities, Specifications or elsewhere, but of which the quantity of work is not measured in units

2.1.18 The units of measurement indicated in the Bill of Quantities are metric units. The following Abbreviations may appear in the Bill of Quantities:

mm = millimetre

m = metre

km = kilometre

km-pass = kilometre-pass

m^2 = square metre

m^2-pass = square metre-pass

ha = hectare

m^3 = cubic metre

m^3-km = cubic metre-kilometre

kW = kilowatt

kN = kilonewton

kg = kilogram

t = ton (1 000 kg)

% = percent

MN = meganewton

MN-m = meganewton-metre

PC Sum = Prime Cost Sum

Prov Sum = Provisional Sum

2.1.19 PRELIMINARY, GENERAL AND SITE ESTABLISHMENT

2.1.19.1 Provision where applicable

Provision is made in the Bill of Quantities for items to cover the Contractors cost to supply, erect commission, maintain and eventually demolish and remove sore facilities, plant, tools and equipment, and for the Contractor to comply with any other obligations for a preliminary and general nature in terms of the contract. The sum tendered in the Bill of Quantities for any preliminary and general item shall cover the Contractors direct and overhead costs, profit and all other costs for the provision of the item and/or compliance with obligations, liabilities risks and requirements associated with the item

2.1.19.2 Payment for Fixed Cost Items

The sum tendered for these items will be paid in accordance with the relevant clauses pertaining thereto on the Bill of Quantities.

2.1.19.3 Payment for Time-related Items

The sum tendered for these items will be paid in accordance with the relevant clauses pertaining thereto on the Bill of Quantities.

2.1.19.4 Payment for Value-related Items

The sum tendered for these items will be paid in accordance with the relevant clauses pertaining thereto on the Bill of Quantities.

2.2 BILL OF QUANTITIES

See attached

2.3 DRAWINGS

Drawings are available on request and can be requested from the Programme Manager: Mr. Thamsanqa Vilakazi

3. SCOPE OF WORK

In the event of any discrepancy between the Scope of Works and a part or parts of the SANS 10400 Standardized Specifications, the Bill of Quantities or the Drawings, the Project Specifications shall take precedence and prevail in the Contract.

EXTENT OF WORKS.

The contractor is to supply, install commission and test air-conditioning units as per the technical specifications

3.1.4 LOCATION OF THE WORKS

Runnymede Community Library, 8CQW+Q3, Runnymede, Limpopo Province

3.1.5 TEMPORARY WORKS

Not applicable

3.2.3 CONTRACTOR'S DESIGN

The Contractor is not required to supply the design of the structures but he will be required to assist with updating of as-built drawings.

The Contractor will be required to obtain quotations from specialist suppliers for certain aspects of the construction of the permanent Works.

C3.4 CONSTRUCTION

C3.4.1 WORKS SPECIFICATIONS

C3.4.1.1 Applicable SANS 10400 Standardized Specifications

The Contractor is referred to Bills of Quantities for the applicable project specifications.

The term "project specification" must be replaced by "scope of works" wherever it appears in these standardized specifications.

C3.4.1.2 Particular Specifications

The Contractor is referred to the specifications on drawings and in the Bills of Quantities for the Particular Specifications for work not covered by the Model Preambles for Trades (1999 edition) published by the Association of South African Quantity Surveyors

C3.4.1.3 National and International Standards

Contractors are referred to the Bills of Quantities for national and international standards where applicable.

C3.4.1.4 Variations and Additions to the SANS 10400 Standardized Specifications

The Contractor is referred to Bills of Quantities for the applicable project specifications here applicable

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C3.4.2 SITE ESTABLISHMENT

C3.4.2.1 Services and facilities provided by the Employer

(a) Water sources

Potable water supplies available

A reticulated potable water supply is available in the vicinity of the Site.

Should the Contractor, in complying with his obligations in terms of sub-clause C3.4.2.2(a): Water, wish to utilize such water supply, he shall himself be responsible for making his own arrangements with the responsible water supply authority for the supply of all water that he may require from such reticulation network for construction purposes as well as for domestic consumption.

If so required by the responsible water supply authority, the Contractor shall further be responsible, at his own cost, for making or otherwise providing metered connections to the available services at the positions specified by the water authority, as well as for the removal of such connections on completion of the

Contract. No warranty is offered or given by the Employer that the existing available reticulated water supply will necessarily be adequate for the Contractor's purposes nor that such supply is in any way guaranteed.

(b) Electricity supply

Electrical power supply available.

The Contractor shall, in accordance with the provisions of sub-clause C3.4.2.2(b), and at his own cost, make all arrangements necessary for the supply and distribution of electrical power required for construction purposes as well as for use in and about his site establishment. The Contractor shall comply with all prevailing legislation in respect of the generation and distribution of electricity and shall, when required by the Principal Agent, produce proof of such compliance.

(c) Excrement disposal

A reticulated water-borne sewage disposal system exists in the vicinity of the Site. Should the Contractor, in complying with his obligations in terms of subclause C3.4.2.2(c): Excrement disposal, wish to avail himself of such facility, he shall, in accordance with the provisions of sub-clause C3.4.2.2(c), and at his own cost, be responsible for making his own arrangements with the responsible disposal authority, and for making such connections he may require to the available services. If so required by the responsible sewage disposal authority, the Contractor shall, at his own cost, be responsible for making connections to the available services at the positions specified by the sewage disposal authority, as well as for the removal of such connections on completion of the Contract.

No warranty is offered or given by the Employer that the existing available reticulated water-borne sewage disposal will necessarily be adequate for the Contractor's purposes nor that its operation is in any way guaranteed.

(d) Area for contractor's site establishment

A specific area in close proximity to or on the Site of the Works will be made available by the Employer to the Contractor for the Contractor's site establishment. The specific area for the Contractor's site establishment will be identified to the Contractor by the Principal

Agent and the Contractor shall have sole use of such area, free of charge, for the duration of the Contract. The Contractor shall use this area only for the purposes of erecting his site offices, workshops, stores and other facilities required for the execution of the

Contract. The Contractor shall not use the area nor allow it to be used for any purposes not directly associated with the execution of the Contract.

The Contractor shall be responsible for arranging, at his own cost, for the provision of all services he may require in the area, as well as elsewhere on the Site.

Should the Contractor deem the area made available by the Employer to be inadequate or unsuitable for the Contractor's particular needs, then the Contractor shall be at liberty to make his own arrangements

with the owners of other sites which he considers are better suited to his needs; provided always that the use by the Contractor of any area other than that made available to him by the Employer shall be subject to the prior written approval of the Principal Agent, which approval shall not be unreasonably withheld; and provided further that the Contractor shall have no claim against the Employer in respect of any costs incurred by him, either directly or indirectly in consequence of utilising any area other than that made available to him by the Employer, and which costs exceed those costs allowed for by the Contractor in his Bid.

(e) Rail facilities

Not Applicable

C3.4.2.2 Facilities provided by the Contractor

(a) Facilities for the Principal Agent

(i) Office accommodation

No separate office is required for the Principal Agent or his Representative, but the Contractor must provide a suitable office desk with lockable drawers, an office chair and a lockable plan cupboard in one of his offices, for the exclusive use of the Principal and his

Representative.

The Principal Agent and his Representative shall be allowed free use of all the Contractor's site facilities. The Principal Agent and his Representative shall be allowed free use of survey equipment and assistants to carry out control work as and when required, and the Contractor shall provide all pegs, concrete, tools and other necessary items as well as all necessary labour for excavation, bush clearing, mixing and placing of concrete, as and when required for the control of the setting out of the Works.

Water

The Contractor shall, at his own expense, be responsible for obtaining and providing all water as may be required for the purposes of executing the Contract, including water for both construction purposes and domestic use, as well as for making all arrangements in connection therewith. The Contractor shall further, at his own expense, be responsible for providing all necessaries for procuring, storing, transporting and applying water required for the execution of the Contract, including but not limited to all piping, valves, tanks, pumps, meters and other plant and equipment, as well as for all work and superintendence associated therewith.

The sources of all water utilised for the purposes of the Contract shall be subject to the prior approval of the Engineer, which approval shall not be unreasonably withheld.

Survey equipment

The Contractor shall, for the duration of the Contract, provide the necessary survey equipment for the exclusive use of the Principal Agent and his staff:

All such survey equipment provided by the Contractor shall be in good condition, properly calibrated and fit for the purpose and shall be kept fully serviceable at all times by the

Contractor at his own cost. The Contractor shall have any defective equipment repaired or replaced at his own cost within 12 hours after notification by the Principal Agent staff.

Where required by the Principal Agent, the Contractor shall at his own cost, promptly arrange for the recalibration of survey equipment provided.

(vi) Telephone facilities

The Contractor shall for the duration of the project supply telephone, telefax and e-mail facilities on site which facility will also be made available for use of the Principal Agent and his Representative. These facilities must always be in working order.

(vii) Computer facilities

Not required

Permits and way-leaves

The Contractor shall be responsible to obtain all the way-leave required under this Contract. The Contractor is referred to the Preliminaries in the Bills of Quantities to compensate the Contractor for all his expenses to obtain the way-leave.

Features requiring special attention

(a) Site maintenance

During progress of the work and upon completion thereof, the Site of the Works shall be kept and left in a clean and orderly condition. The Contractor shall store materials and equipment for which he is responsible in an orderly manner, and shall keep the Site free from debris and obstructions.

(b) Fencing

Not Applicable

(c) Subcontractors

All matters pertaining to subcontractors (including Nominated Subcontractors) and the work executed by them shall be dealt with directly between the Principal Agent and the

Contractor in the context of all subcontract work being an integral part of the Works for which the Contractor is responsible.

The Principal Agent will not liaise directly with any subcontractors nor will he issue instructions concerning the subcontract works directly to any subcontractor.

All matters arising from the subcontract agreements shall be dealt with directly between the Contractor and the subcontractors and the Principal Agent will not become involved.

Notices, signs and barricades

All notices, signs and barricades may be used only if approved by the Principal Agent. The Contractor shall be responsible for their supply, erection, maintenance and ultimate removal and shall make provision for this in his bidded rates.

The Principal Agent shall have the right to instruct the Contractor to move any sign, notice or advertisement to another position, or to remove it from the Site of the Works if in his opinion it is unsatisfactory, inconvenient or dangerous.

(m) Workmanship and quality control

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the

Contractor shall, at his own expense, institute a quality control system and provide suitably qualified and experienced Principal Agent, foremen, surveyors, materials technicians, other technicians and technical staff, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of supervision and process control, including testing carried out by the Contractor, will be deemed to be included in the rates bidded for the related items of work.

The Contractor's attention is drawn to the provisions of the various Standardized

Specifications regarding the minimum frequency of testing required. The Contractor shall, at his own discretion, increase this frequency where necessary to ensure adequate control.

On completion and submission of every part of the work to the Principal Agent for examination and measurement, the Contractor shall furnish the Principal Agent with the results of the relevant tests, measurements and levels to demonstrate the achievement of compliance with the Specifications.

Plant and materials supplied by the employer

The Employer shall not supply any plant or materials.

C3.4.3.2 Materials, samples and shop drawings

(a) Samples

Materials or work which do not conform to the approved samples submitted in terms of the

Conditions of Contract, will be rejected. The Principal Agent reserves the right to submit samples to tests to ensure that the material represented by the sample meets the specification requirements.

The costs of any such tests conducted by or on behalf of the Principal Agent, the results of which indicate that the samples provided by the Contractor do not conform to the requirements of the Contract, shall, in accordance with the provisions of the Conditions of Contract, be for

HEALTH AND SAFETY REQUIREMENTS AND PROCEDURES

(a) Construction Regulations, 2014

The Contractor shall be required to comply with the Occupational Health and Safety Act, 1993: Construction Regulations, 2014 (the regulations) as promulgated in Government Gazette No 37307 and Regulation Gazette No 10113 of 7 February 2014. (A copy of the Construction Regulations is included as an Annexure in this Volume). Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

The proposed type of work, materials to be used and potential hazards likely to be encountered on this Contract are detailed in the Project Specifications, Schedule of Quantity and Drawings, as well as in the Employers' health and safety specifications (regulation 4(1)) of the Construction Regulations 2014, which are bound in the Contract document/will be issued separately by the Employer.

The Contractor shall in terms of regulation 5(1) provide a comprehensive health and safety plan detailing his proposed compliance with the regulations, for approval by the Employer.

The Contractor shall at all times be responsible for full compliance with the approved plan as well as the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the abovementioned plan or regulations.

A payment item is/Payment items are included in the Schedule of Quantities to cover the Contractor's cost for compliance with the OHS Act and the abovementioned regulations.

TENDER / QUOTATION DATA

Clause number	REQUEST FOR QUOTATION FROM MECHANICAL CONTRACTORS TO SUPPLY AND INSTALLATION OF AIR CONDITIONING SYSTEMS UNITS IN RUNNYMEDE LIBRARY IDT - LP–DSAC- RM- AIRCONDITIONING SYSTEM – 022024
1	**The Employer is Independent Development Trust (IDT) on behalf of the Limpopo Department of Sports, Arts and Culture**
2	**Inspections, Tests and Analysis** Access shall be provided for inspections, tests and analysis as may be required by the employer.
3	**Contract period:]** The contract period will be from the date of acceptance of appointment and the expiry is in line with Limpopo panel of CDP deadline.
4	**Central Supplier Database (CSD) on Tax Compliance** No contract may be awarded to a person who has non-compliant tax status found on CSD or South African Revenue Service ("SARS") certifying the taxes of that person to be in order or that suitable arrangement have been made with SARS"
5	**Opening of Fee proposal Submissions** Fee proposals will not be opened in public.
6	**Evaluation of Tender Offers** The bidders will be evaluated on specific goals point scoring and the price as per the IDT 80/20 score card. A contract may, on reasonable and justifiable grounds, be awarded to a bidder that did not score the highest number of aggregate points where the IDT is managing risk, i.e. where the bidder has underpriced such that, the project may be compromised by such underpricing or in spreading of work to other bidders in case where the highest points scorer has already been awarded work.
7	A**cceptance of Tender Offers** Tender offers will only be accepted if: a) Central Supplier Database (CSD) on Tax Compliance no contract may be awarded to a person who has non-compliant tax status found on CSD or South African Revenue Service ("SARS") certifying the taxes of that person to be in order or that suitable arrangement have been made with SARS" b) the tenderer has completed the Declaration of Interest (SBD 4)and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the employer or potentially compromise the tender process and persons in the employ of the state are not permitted to submit tenders or participate in the contract; c) Fully completed and signed **ALL SBD Forms** d) the tenderer completed in full, signed and witnessed form of offer. e) The invitation by IDT
8	**See clarification** Request clarification of the tender documents (if necessary) by notifying the employer **at least two working days before the Closing Date** stated in the terms of reference.
9	**The additional conditions of tender are:** The employer is not obliged to accept the lowest bidder.

Clause number	REQUEST FOR QUOTATION FROM MECHANICAL CONTRACTORS TO SUPPLY AND INSTALLATION OF AIR CONDITIONING SYSTEMS UNITS IN RUNNYMEDE LIBRARY IDT - LP–DSAC- RM- AIRCONDITIONING SYSTEM – 022024
10	**Notice to Unsuccessful Bidders** Should the bidders not hear from IDT within 30 days from the fee proposal closure day i.e. submission date of the fee proposal they should consider their submission unsuccessful. No written notification will be issued by the Employer to unsuccessful bidders.
11	**The Contract:** The Fee proposal Document is the contract document for this RFQ and the copy to be submitted to the successful bidder.
12	**Disbursements** Not applicable

STANDARD CONDITIONS OF TENDER

Standard Conditions of Tender

The employer and each tenderer submitting a tender offer shall comply with these conditions of tender. In their dealings with each other, they shall discharge their duties and obligations as set out in the tender data, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

- The employer and the tenderer and all their agents and employees involved in the tender process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

Note: 1) A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.

2) Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation,allegiance or loyalty which would in any way affect any decisions taken.

- The employer shall not seek and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

a) **Conflict of interest** means any situation in which:
   i) someone in a position of trust has competing professional or personal interests which make it difficult to fulfill his or her duties impartially;
   ii) an individual or organisation is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or
   iii) incompatibility or contradictory interests exist between an employee and the organisation which employs that employee.

b) **Comparative offer** means the tenderer's financial offer after all tendered parameters that will affect the value of the financial offer have been taken into consideration in order to enable comparisons to be made between offers on a comparative basis

c) **Corrupt practice** means the offering, giving, receiving or soliciting of anything of value to influence the action of the employer or his staff or agents in the tender process; and

d) **Fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels

e) **organization** means a company, firm, enterprise, association or other legal entity, whether incorporated or not, or a public body

f) **Quality (functionality)** means the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs

Communication and employer's agent

- Each communication between the employer and a tenderer shall be to or from the Employer or the employer's agent only, and in a form that can be read, copied and recorded. Writing shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a tenderer. The name and contact details of the employer's agent shall be stated at the time of appointment.

The employer's right to accept or reject any tender offer

- The employer may accept or reject any variation, deviation, tender offer, or alternative tender offer, and may cancel the tender process and reject all tender offers at any time before the formation of a contract. The employer shall not accept or incur any liability to a tenderer for such cancellation and rejection.

Procurement procedures

General

All responsive tenderers, or not less than three responsive tenderers that are highest ranked in terms of the evaluation method and evaluation criteria stated in the tender data, **may** be invited in each round to enter into competitive negotiations, based on the principle of equal treatment and keeping confidential the proposed solutions and associated information.

At the conclusion of each round of negotiations, tenderers **may** be invited by the employer to make a fresh tender offer, based on the same evaluation criteria, with or without adjusted weightings. Tenderers will be advised accordingly when they are to submit their best and final offer.

The contract shall be awarded when the evaluation was done by the panel of not less than three persons and the Employer has the submitted best and final offer.

The employer shall evaluate tenders received during in terms of the method of evaluation stated in the fee proposal data, and award the contract in terms of these conditions of tender.

Tenderer's obligations

Eligibility

Submit a tender offer only if the tenderer satisfies the criteria stated in the fee proposal data and the tenderer, or any of his principals, is not under any restriction to do business with employer.

Notify the employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the employer's written approval to do so prior to the closing time for tenders.

Cost of tendering

Accept that the employer will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

Check documents

Check the tender documents on receipt for completeness and notify the employer of any discrepancy or omission.

Confidentiality and copyright of documents

Treat as confidential all matters arising in connection with the tender. Use and copy the documents issued by the employer only for the purpose of preparing and submitting a tender offer in response to the invitation.

Reference documents

Obtain, as necessary for submitting a tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the tender documents by reference.

Acknowledge addenda

Acknowledge receipt of addenda to the tender documents, which the employer may issue, and if necessary apply for an extension to the closing time stated in the fee proposal data, in order to take the addenda into account.

Clarification meeting

N/A

Seek clarification

Request clarification of the fee proposal documents, if necessary, by notifying the employer at least ONE working day before the closing time stated in the tender data.

Insurance

Be aware that the extent of insurance to be provided by the employer (if any) may not be for the full cover required in terms of the conditions of contract identified in the contract data. The tenderer is advised to seek qualified advice regarding insurance and to ensure that he or she is adequately covered for the duration of the project.

Pricing the tender offer

Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes (except Value Added Tax (VAT), and other levies payable by the successful tenderer'.

Show VAT payable by the employer separately as an addition to the tendered total of the prices.

Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

Alterations to documents

Not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations. Erasures and the use of masking fluid are prohibited.

Alternative tender offers

Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.

Accept that an alternative tender offer may be based only on the criteria stated in the fee proposal data or criteria otherwise acceptable to the employer.

Submitting a tender offer

Submit one tender offer only, either as a single tendering entity to provide the whole of the works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

Return all returnable documents to the employer after completing them in their entirety by writing in black ink.

Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.

Sign the original and all copies of the tender offer where required in terms of the tender data. The employer will hold all authorized signatories liable on behalf of the tenderer.

Seal the original and each copy, where applicable, of the tender offer as separate packages marking the packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the terms of reference, as well as the tenderer's name and contact address.

Seal the original tender offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the fee proposal data.

Accept that the employer shall not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.

Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer.

Information and data to be completed in all respects

Accept that tender offers, which do not provide all the data or information requested completely and in the form required, may be regarded by the employer as non-responsive.

Ensure that the employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Accept that proof of posting shall not be accepted as proof of delivery.

Accept that, if the employer extends the closing time stated in the tender data for any reason, the requirements of these conditions of tender apply equally to the extended deadline.

Tender offer validity

Hold the tender offer(s) valid for acceptance by the employer at any time during the validity period stated in the tender data after the closing time stated in the tender data.

If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period with or without any conditions attached to such extension.

Accept that a fee proposal submission that has been submitted to the employer may only be withdrawn or substituted by giving the Employer or the employer’s agent written notice before the closing time for tenders that a fee proposal is to be withdrawn or substituted.

Clarification of tender offer after submission

Provide clarification of a tender offer in response to a request to do so from the employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.

Note: Clarification of the offer does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.

Provide other material

Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position, preferential arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

Disposal of samples of materials provided for evaluation by the employer, where required.

Inspections, tests and analysis

Provide access during working hours to premises for inspections, tests and analysis as provided for in the tender data.

Submit securities, bonds, policies, etc.

If requested, submit for the employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

Check final draft

Check the final draft of the contract provided by the employer within the time available for the employer to issue the contract.

Certificates

Include in the tender submission or provide the employer with any certificates as stated in the tender data.

The employer's undertakings

Respond to requests from the tenderer

Unless otherwise stated in the tender Data, respond to a request for clarification received up to two working days before the tender closing time stated in the Tender Data and notify all tenderers who drew procurement documents.

Consider any request to make a material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

a) an individual firm, or a joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements;
b) the new partners to a joint venture were not prequalified in the first instance, either as individual firms or as another joint venture; or
c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.

Issue Addenda
If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who drew documents.

Return late tender offers
Return tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.

Non-disclosure
Not disclose to tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful tenderer.

Grounds for rejection and disqualification
Determine whether there has been any effort by a tenderer to influence the processing of tender offers and instantly disqualify a tenderer (and his tender offer) if it is established that he engaged in corrupt or fraudulent practices.

Test for responsiveness

Determine, after opening and before detailed evaluation, whether each tender offer properly received:

a) complies with the requirements of these Conditions of Tender,
b) has been properly and fully completed and signed, and
c) is responsive to the other requirements of the tender documents.

A responsive tender is one that conforms to all the terms, conditions, and specifications of the tender documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer*'s* opinion, would:

a) detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work,
b) significantly change the Employer*'s* or the tenderer's risks and responsibilities under the contract, or
c) affect the competitive position of other tenderers presenting responsive tenders, if it were to be rectified.

Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

Arithmetical errors, omissions and discrepancies

Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.

Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers:

a) the gross misplacement of the decimal point in any unit rate;
b) omissions made in completing the pricing schedule or bills of quantities; or
c) arithmetic errors in:
    i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or
    ii) the summation of the prices.

Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

a) If bills of quantities or pricing schedules apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected.
b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern and the tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices.

Clarification of a tender offer

Obtain clarification from a tenderer on any matter that could give rise to ambiguity in a contract arising from the tender offer.

General

Appoint an evaluation panel of not less than three persons. Reduce each responsive tender offer to a comparative offer and evaluate them using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data:

Acceptance of tender offer

Accept the tender offer, if in the opinion of the employer, it does not present any unacceptable commercial risk and only if the tenderer:

a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,
b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,
c) has the legal capacity to enter into the contract,
d) is not insolvent, in receivership, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,
e) complies with the legal requirements, if any, stated in the tender data, and

f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

Prepare contract documents

If necessary, revise documents that shall form part of the contract and that were issued by the employer as part of the tender documents to take account of:

a) addenda issued during the tender period,
b) inclusion of some of the returnable documents, and
c) other revisions agreed between the employer and the successful tenderer.

Complete the schedule of deviations attached to the form of offer and acceptance, if any.

Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

Provide copies of the contracts

Provide to the successful tenderer the number of copies stated in the Tender Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

PART A
INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE INDEPENDENT DEVELOPMENT TRUST (IDT)					
RFQ/BID NUMBER:	**IDT - LP–DSAC- RM- AIRCONDITIONING SYSTEM – 022024**	CLOSING DATE:	22 February 2024	CLOSING TIME:	12h00
DESCRIPTION	**REQUEST FOR QUOTATION FROM MECHANICAL CONTRACTORS TO INSTALL AIRCONDITION UNITS IN RUNNYMEDE LIBRARY**				

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS)*

IDT Regional Offices

22 Hans van Rensburg Street

Polokwane, 0700

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO		**TECHNICAL ENQUIRIES MAY BE DIRECTED TO:**	
CONTACT PERSON	**Kgotsofalo Malapane**	CONTACT PERSON	**Thamsanqa Vilakazi**
TELEPHONE NUMBER		TELEPHONE NUMBER	
FACSIMILE NUMBER	**N/A**	FACSIMILE NUMBER	**N/A**
E-MAIL ADDRESS	KgotsofaloM@idt.org.za	E-MAIL ADDRESS	ThamsangaV@idt.org.za

SUPPLIER INFORMATION

NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		**OR**	CENTRAL SUPPLIER DATABASE No:	MAAA
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE	TICK APPLICABLE BOX] ☐ Yes ☐ No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT		[TICK APPLICABLE BOX] ☐ Yes ☐ No

[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSES) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]

ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	☐Yes ☐No [IF YES ENCLOSE PROOF]	ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES, ANSWER THE QUESTIONNAIRE BELOW]

IN LINE WITH THE CURRENT CHANGE OF SBD 6.1, THE BBBEE PREFERENCE POINT AND CERTIFICATE SHALL NOT BE CONSIDERED OR EVALUATED. BIDDERS SHOULD NOT TICK OR ATTACH ANY BBBEE INFORMATION

QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?	☐ YES ☐ NO
DOES THE ENTITY HAVE A BRANCH IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?	☐ YES ☐ NO
IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?	☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.

1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.**

1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

1.4. **THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).**

2. TAX COMPLIANCE REQUIREMENTS

2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.

2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.

2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.

2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.

2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.

2.6 WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER: ……

CAPACITY UNDER WHICH THIS BID IS SIGNED: ……
(Proof of authority must be submitted e.g. company resolution)

DATE: ……...

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest1 in the enterprise, employed by the state? **YES/NO**

2.1.1. If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	**Identity Number**	**Name of State institution**

2.2. Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1. If so, furnish particulars:

……

……

2.3. Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:

[1] the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

……
……

3 DECLARATION

I, the undersigned, (name)…… in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;
3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium2 will not be construed as collusive bidding.
3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
3.5 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.6 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

3.7 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… Signature	…… Date
…… Position	…… Name of bidder

[2] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

AUTHORITY TO SIGN A BID

A. COMPANIES

If a Bidder is a company, a certified copy of the resolution by the board of directors, personally signed by the chairperson of the board, authorising the person who signs this bid to do so, as well as to sign any contract resulting from this bid and any other documents and correspondence in connection with this bid and/or contract on behalf of the company must be submitted with this bid, that is before the closing time and date of the bid

AUTHORITY BY BOARD OF DIRECTORS

By resolution passed by the Board of Directors on ….....20.....,

Mr/Mrs/Ms……

(whose signature appears below) has been duly authorised to sign all documents in connection with this bid on behalf of

(Name of Company) …….....

IN HIS/HER CAPACITY AS: .....

SIGNED ON BEHALF OF COMPANY: ……..

.....
(PRINT NAME)

SIGNATURE OF SIGNATORY: ..... **DATE**: .....

WITNESSES: 1.....

2.....

B. SOLE PROPRIETOR (ONE - PERSON BUSINESS)

I, the undersigned..... hereby confirm that I am the sole owner of the business trading as.....

.....

SIGNATURE…… **DATE**……

C. PARTNERSHIP

The following particulars in respect of every partner must be furnished and signed by every Partner :

Full name of partner	Residential address	Signature
.....	.....	.....
.....	.....	.....
.....	.....	.....

We, the undersigned partners in the business trading as ..... hereby authorise .....to sign this bid as well as any contract resulting from the bid and any other documents and correspondence in connection with this bid and /or contract on behalf of

.....	.....	.....
SIGNATURE	**SIGNATURE**	**SIGNATURE**
.....	.....	.....
DATE	**DATE**	**DATE**

D. CLOSE CORPORATION

In the case of a close corporation submitting a bid, a certified copy of the Founding Statement of such corporation shall be included with the bid, together with the resolution by its members authorising a member or other official of the corporation to sign the documents on their behalf.

By resolution of members at a meeting on ..... 20.....

at……. Mr/Mrs/Ms....., whose

signature appears below, has been authorised to sign all documents in connection with this bid on

behalf of

(Name of Close Corporation) …….....

.....

SIGNED ON BEHALF OF CLOSE CORPORATION : ……

……..
(PRINT NAME)

IN HIS/HER CAPACITY AS .....**DATE**: .....

SIGNATURE OF SIGNATORY: .....

WITNESSES: 1.....

2.....

E. CO-OPERATIVE

A certified copy of the Constitution of the co-operative must be included with the bid, together with the resolution by its members authoring a member or other official of the co-operative to sign the bid documents on their behalf.

By resolution of members at a meeting on .....……... 20.....

at.....

Mr/Mrs/Ms....., whose signature appears below,

has been authorised to sign all documents in connection with this bid on behalf of (Name of

cooperative) .....……

SIGNATURE OF AUTHORISED REPRESENTATIVE/SIGNATORY: ….....

IN HIS/HER CAPACITY AS: .....……

DATE: ......……

SIGNED ON BEHALF OF CO-OPERATIVE: .....

NAME IN BLOCK LETTERS: ……

WITNESSES: 1.....

2.....

F JOINT VENTURE

If a bidder is a joint venture, a certified copy of the resolution/agreement passed/reached signed by the duly authorised representatives of the enterprises, authorising the representatives who sign this bid to do so, as well as to sign any contract resulting from this bid and any other documents and correspondence in connection with this bid and/or contract on behalf of the joint venture must be submitted with this bid, before the closing time and date of the bid.

AUTHORITY TO SIGN ON BEHALF OF THE JOINT VENTURE

By resolution/agreement passed/reached by the joint venture partners on……20……

Mr/Mrs/Ms…….,Mr/Mrs/Ms…….

Mr/Mrs/Ms…….and

Mr/Mrs/Ms……..

(whose signatures appear below) have been duly authorised to sign all documents in connection with this bid on behalf of:(Name of Joint Venture) ……..

IN HIS/HER CAPACITY AS: ……..

SIGNED ON BEHALF OF (COMPANY NAME): ……..
(PRINT NAME) ……..

SIGNATURE: …….. DATE: ……

IN HIS/HER CAPACITY AS: ……

SIGNED ON BEHALF OF (COMPANY NAME): ……
(PRINT NAME)……..

SIGNATURE: …….. DATE: ……

IN HIS/HER CAPACITY AS: ……

SIGNED ON BEHALF OF (COMPANY NAME): ……
(PRINT NAME) ……
SIGNATURE: …….. DATE: ……
IN HIS/HER CAPACITY AS: ……..

G. CONSORTIUM

If a bidder is a consortium, a certified copy of the resolution/agreement passed/reached signed by the duly authorised representatives of concerned enterprises, authorising the representatives who sign this bid to do so, as well as to sign any contract resulting from this bid and any other documents and correspondence in connection with this bid and/or contract on behalf of the consortium must be submitted with this bid, before the closing time and date of the bid.

AUTHORITY TO SIGN ON BEHALF OF THE CONSORTIUM

By resolution/agreement passed/reached by the consortium on……20……

Mr/Mrs/Ms……..

(whose signature appear below) have been duly authorised to sign all documents in connection

with this bid on behalf of:

(Name of Consortium) ……..

IN HIS/HER CAPACITY AS: ……

SIGNATURE: ……. **DATE:** ……

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

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1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 **To be completed by the organ of state**

a) The applicable preference point system for this tender is the 80/20 preference point system.

b) The lowest/ highest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

(a) Price; and

(b) Specific Goals.

1.4 **To be completed by the organ of state:**

The maximum points for this tender are allocated as follows:

	POINTS	
PRICE	**80**	
SPECIFIC GOALS	**20**	
TARGETED GROUP		
Women (100%)	6	
Youth (100%)	6	
People with Disabilities (100%)	4	
Black (100%)	4	
Total points for Price and SPECIFIC GOALS		

1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.

1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

(a) **"tender"** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price fee proposals, competitive tendering process or any other method envisaged in legislation;

(b) **"price"** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;

(c) **"rand value"** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;

(d) **"tender for income-generating contracts"** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and

(e) **"the Act"** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 **or** **90/10**

$$Ps = 80\left(1 - \frac{Pt - P\,min}{P\,min}\right) \quad \text{or} \quad Ps = 90\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 **or** **90/10**

$$Ps = 80\left(1 + \frac{Pt - P\,max}{P\,max}\right) \quad \text{or} \quad Ps = 90\left(1 + \frac{Pt - P\,max}{Pmax}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:

4.2. In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—

(a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or

(b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system, then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

(Note to organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.

***Note to tenderers: The tenderer must indicate how they claim points for each preference point system.*)**

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (80/20 system) (To be completed by the tenderer)
Women (100%)	6	
Youth (100%)	6	
People with Disabilities (100%)	4	
Black (100%)	4	

Source Documents to be submitted with the Bid or RFQ

*CIPC Document	(Company Registration Document will be required for verification (CIPC DOC))
*Woman	(Originally Certified ID Document)
*Youth	(Originally Certified ID Document)
*People with Disability	(Originally signed and stamped Letter from professionally registered medical doctor indicating Practice number)
*Black Ownership	(Originally Certified ID Document)

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm……

4.4. Company registration number: ……

4.5. TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
- ☐ One-person business/sole propriety
- ☐ Close corporation
- ☐ Public Company
- ☐ Personal Liability Company
- ☐ (Pty) Limited
- ☐ Non-Profit Company
- ☐ State Owned Company

[TICK APPLICABLE BOX]

4.6. I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;

iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

(a) disqualify the person from the tendering process;

(b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution, if deemed necessary.

.

	…… **SIGNATURE(S) OF TENDERER(S)**
SURNAME AND NAME:	……
DATE:	……
ADDRESS:	……
	……
	……
	……

FORM OF OFFER AND ACCEPTANCE

The employer, identified in the acceptance signature block, has solicited offers to enter into a contract for the procurement of:

REQUEST FOR QUOTATION FROM MECHANICAL CONTRACTORS TO SUPPLY AND INSTALLATION OF AIR CONDITIONING SYSTEM UNITS IN RUNNYMEDE LIBRARY

The tenderer, identified in the offer signature block, has examined the documents listed in the tender data and addenda thereto as listed in the returnable schedules, and by submitting this offer has accepted the conditions of tender.

By the representative of the tenderer, deemed to be duly authorized, signing this part of this form of offer and acceptance, the tenderer offers to perform all of the obligations and liabilities of the contractor under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the conditions of contract identified in the contract data.

THE TOTAL DISCOUNTED OFFER (IN %) INCLUSIVE OF VALUE ADDED TAX IS:

. . . . (in words);

.... (in figures)

This offer may be accepted by the employer by signing the acceptance part of this form of offer and acceptance and returning one copy of this document to the tenderer before the end of the period of validity stated in the tender data, whereupon the tenderer becomes the party named as the contractor in the conditions of contract identified in the contract data.

Signature . . . . . Date . . . . . .

. . . . .

Name . . . . . Identity number . . . . . .

. . . .

Capacity . . . . . .

for the tenderer

(Name and . . . . . .

. . .

address of

organization) . . . . . .

. . .

Name and

signature

of witness . . . .

NOTE: Failure of a Bidder to complete in full and sign this part of the tender form (offer) will invalidate the tender offer

FORM OF OFFER AND ACCEPTANCE

Acceptance

By signing this part of this form of offer and acceptance, the employer identified below accepts the tenderer's offer. In consideration thereof, the employer shall pay the contractor the amount due in accordance with the conditions of contract identified in the contract data. Acceptance of the tenderer's offer shall form an agreement between the employer and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract:

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as listed in the tender schedules as well as any changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance, are contained in the schedule of deviations attached to and forming part of this agreement. No amendments to or deviations from said documents are valid unless contained in this schedule.

The tenderer shall within two weeks after receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the Employer or the employer's agent (whose details are given in the contract data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the contract data. Failure to fulfill any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the tenderer receives one fully completed original copy of this document, including the schedule of deviations (if any). Unless the tenderer (now contractor**)** within five working days of the date of such receipt notifies the employer in writing of any reason why he cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

Signature . . . . . Date . . . . . .

Name . . . . . Identity number . . . . . .

Capacity . . . . . .

for the Employer The Independent Development Trust (IDT)
22 Hans van Rensburg
Polokwane
0699

Name and signature of witness . . . . . .

. . . . . Date . . . . . .

RUNNYMEDE LIBRARY

SPECIFICATION AND CONTRACT DOCUMENTATION

FOR THE

AIR-CONDITIONING AND VENTILATION

INSTALLATION

DOCUMENT NUMBER: 33738-MECH-SPEC-RUN-01-01 REV 0

The following signatories have approved the report:

Name	Purpose	Signature	Date
Siyabonga Mazibuko	Tender		2024/01/06

Rev	Description	Author	Pages
0	Generated and Issued for Tender	SM	all

NOTES TO TENDERERS:

1. Tenderer's attention is drawn to the fact that work in this section may only be executed by a SPECIALIST AIR-CONDITIONING SUB-CONTRACTOR and proof of the aforementioned must be submitted.

2. The bill of quantities for the HVAC installation is a PROVISIONAL BILL OF QUANTITIES that shall be re-measured at completion of the contract.
3. The Air-conditioning specification forms an integral part of these bills of quantities and must be read in conjunction with the bills of quantities.

4. The contractor, on acceptance of his tender shall submit within the period stated, the information indicated on the forms following immediately after the Summary of the bills of quantities for this installation.

5. The Tenderer is referred to the Architect's Layout drawings for the building.

6. The Tenderer shall submit the HVAC Bills of Quantities fully completed with his / her tender.

SPECIFICATION AND TENDER DOCUMENTATION FOR THE

MECHANICAL AIR-CONDITIONING AND VENTIALTION INSTALLATION

AT THE

RUNNYMEDE LIBRARY

INDEX:

SECTION 1: PART 1

LIST OF PREVIOUS SIMILAR CONTRACTS AND REFERENCES

TO BE COMPLETED BY THE TENDERER

The Tenderer shall complete the list below, duly listing at least three (3) previous similar contracts successfully completed, plus the consultancy firm / client involved in the project. The information below will be vetted by the project consulting engineer / client representative.

1. Contract ……...

   Client ……...

   Telephone ……...

   Description ……...

   Value R ……. (to the nearest thousand)

   Year completed……..

2. Contract ……...

   Client ……...

   Telephone ……...

   Description ……...

   Value R……. (to the nearest thousand)

   Year completed……..

3. Contract ……...

   Client ……...

   Telephone ……...

   Description……...

   Value R……. (to the nearest thousand)

   Year completed ……..

SECTION 1: PART 2

LIST OF PROPOSED DEVIATIONS FROM THE SPECIFICATIONS

The Tenderer shall list below any proposed deviation from the specification with the reasons and descriptions thereof. If there are no deviations write NIL. Only deviations listed here will be considered.

Item	Description	Add	Omit

Tenderer's signature: _____

Date: _____

Witnesses:

1. _____

2. _____

SECTION 1: PART 3

SHEDULE OF SUB-CONTRACTORS

SUB-CONTRACTORS TO BE EMPLOYED

The Tenderer must sate below the sub-contractors he intends to employ on this Contract.

NAME	DESCIPTION OF WORK
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..
……	……..

Date: _____ Tenderer Signature: _____

SECTION 1: PART 4

AIR-CONDITIONING INSTALLATION MATERIAL SCHEDULE

The contractor shall complete the following schedules and submit them with the tender document.

The schedules will be scrutinised by the Representative/Agent and should any material offered not comply with the requirements contained in the specification, the Contractor will be required to supply material in accordance with the contract at no additional cost.

NB: **Only one manufacturer's name to be inserted for each item.**

Item	Material	Make or trade name	Country of origin
1.	Rooftop Package Unit		
2.	DX inverter type split units		
3.	In-line duct mounted fresh air fans		

NOTE:

Should the contractor wish to supply materials other than that originally offered, prior written approval must be obtained from the Representative/Agent before any orders are placed.

CONTRACTOR:

_____

SIGNED: _____

DATE: _____

SECTION 1: PART 5

SCHEDULE OF IMPORTED MATERIALS AND EQUIPMENT TO BE COMPLETED BY TENDERER

Item	Material/Equipment	Rand (R) (Excluding VAT)
1		
2		
3		
4		
5		
6		

The Contractor shall list all imported items, materials and/or equipment which shall be excluded from the Contract Price Adjustment Provisions and shall be adjusted in terms of currency fluctuations only.

Copies of the supplier's quotations for the items, materials or equipment (provided that such costs shall not be higher than the relevant contract rate as listed above) should be lodged with the Representative/Agent of the client within 60 (sixty) days from the date of acceptance of the tenders.

No adjustment of the local VAT amount, nor the contractor's profit, discount, markup, handling costs, etc shall be allowed.

The Contractor is referred to the price adjustment formula applicable to the main contract and should acquaint himself / herself with the contents thereof.

CONTRACTOR: _____

SIGNED: _____

DATE: _____

SECTION 2: PART 1:

GENERAL TECHNICAL SPECIFICATION

SECTION 2 PART 1.0

GENERAL REQUIREMENTS

AIR CONDITIONING AND VENTILATION INSTALLATION

1 GENERAL INFORMATION

- The General Technical requirements cover the delivery, installation, testing, commissioning and maintenance of the Air Conditioning and Ventilation Installation.

    - The complete Air Conditioning and Ventilation Installation shall comply with the requirements of this specification. Should any discrepancies or contradictions arise between this part of the Specification and the Detailed Technical specification (Section 3) then the latter shall take preference. Should any discrepancies appear between the written specifications and the drawings, tenderers shall ascertain the position before tender closing date, otherwise the worst or any case may be assumed by the Engineer entirely at his discretion.
    - This specification is of simplified form and includes abbreviated sentences. The omission of words or phrases shall be implied by inference.
    - The Contractor is required to provide all material, equipment, labour and services and to perform all operations required for the installation to be complete and operative.
    - “Document" shall mean the complete set of contract and specification documents including all drawings variation orders and Engineers instructions issued in terms of the contract.
    - The Engineer will inspect the installation from time to time during the progress of the work. Discrepancies will be pointed out to the Contractor and these shall be remedied at the Contractor's expense.
    - Under no circumstances shall the above mentioned inspections relieve the Contractor of his obligations in terms of this document.
    - The Contractor shall notify the Engineer timeously when the installation reaches important stages of completion (e.g. equipment installation, pressure testing, proving connections etc.) so that the Engineer's representative may schedule his site inspections in the best interests of all concerned. It will be the Contractors responsibility to schedule all inspections so as to give the Engineer at least 2 days advance notice. No claims for delay will be considered where the Engineer is unable to attend having been given less than 2 days notice.
    - Unless it is explicitly stated to the contrary and words "Subcontractor" and "Contractor" shall refer to the successful tenderer for the Air Conditioning and Ventilation Installation.

2 REGULATIONS

- The installation shall be erected and tested in accordance with the following regulations:
    - The Factories, Machinery and Building Work Act of 191 as amended.
    - The regulations of the local Gas Board.
    - Regulations Governing Patient Care Facilities, Manual R158
    - The SABS Code for the Wiring of premises -SABS 0142-1987 as amended as well as SABS 0180-1974 as amended.
    - The local Municipal By-Laws and Regulations as well as the regulations of the local Supply authority.
    - The local Fire Regulations.
    - The Building regulations as described in SABS 0400 (current edition)
    - The Occupational Health and Safety Act (current edition)
    - The Gauteng Provincial Government Standard Quality Specification for Airconditioning Installations.

- The Contractor shall issue all notices and pay all the required fees in respect of the installation to the authorities, and shall exempt the Owner from all losses, claims, costs or expenditures which may arise as a result of the Contractor's negligence in not complying with the requirements of the regulations.
- It shall be assumed that the Contractor is conversant with the above mentioned requirements. Should any requirements, bye-laws or regulations, which contradict the requirements of this Document, apply or become applicable during erection of the installation, such requirement, by-law or regulation shall overrule this Document and the Contractor shall immediately inform the Engineer of such contradiction. Under no circumstances shall the Contractor carry out any variation to the installation in terms of such contradictions without obtaining written permission to do so from the Engineer.

3 SITE CONDITIONS

- Tenderers are instructed to visited the site and acquaint themselves with all local conditions pertaining to the execution of the installation before tender closing date. No claims from the contractor which may arise from insufficient knowledge of site access, type of site, labour conditions, establishment space, transport and loading/unloading facilities power, water, supply, etc. will be considered after submission of tenders. For services where prior permission is required before contractor can visit the site, a visit will be arranged for all interested parties at their request.

4 ARRANGEMENTS WITH THE SUPPLY AUTHORITY

- The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be required by the local supply Authority unless otherwise specified.
- On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains will be refunded to the Contractor by the Owner.
- It shall be the responsibility of the Contractor to make the necessary arrangements at his own cost with the local supply authority and to supply the labour, equipment and means to inspect, test and commission the installation to the requirement of the local and supply authorities.
- The Contractor shall supply and install all notices and warning signs that are required by the appropriate laws and regulations and/or the Documents.

5 MATERIAL, EQUIPMENT AND WORKMANSHIP

- All material shall be new of high quality and suitable for the conditions on site. Should the materials not be suitable for use under temporary site conditions then the Contractor shall at his own cost provide suitable protection until these unfavourable site conditions cease the exist. All materials and workmanship shall comply with the relevant SABS or BS standards.

- The Contractor shall where requested to do so, submit samples of equipment and material to the Engineer for this approval prior to installation. Samples may be retained in the Engineer's possession until the contract is completed after which they will be returned and no charge will be made for such samples.
- Locally manufactured equipment shall be used where possible and practical in preference to imported equipment. The owner in no way binds himself to assist the Contractor in obtaining import permit for imported equipment.
- The works shall be designed to provide ease of inspections, cleaning and maintenance.
- All artisans employed on site shall be competent in terms of the Regulations and Acts.
- The contract shall be executed to a high standard and to the satisfaction of the Engineer. Should any workmanship, equipment or material not be to the satisfaction of the Engineer, it shall be rectified at the cost of the Contractor and all rejected materials shall be removed from site.
- If, in the opinion of the Engineer, any member of the Contractor's staff is not competent to carry out the work to the required standard, then that person shall be removed from the project if so instructed by the Engineer.

6 OPERATOR TRAINING

- On completion of all tests to the satisfaction of the Engineer the Contractor shall continue to be responsible for the complete operation and maintenance of the plant for a period of one week during which time instruction shall be given to the Employer's staff on the proper operation and maintenance of the plant.
- The operation and maintenance of the plant for the duration of the instruction period shall not in any way relieve the Contractor of his responsibility under the terms of the contract.

7 TOOLS AND EQUIPMENT

- Unless otherwise specified, the Contractor shall provide all tools, materials, scaffolding, power, water, etc. necessary for the proper and efficient execution of the work covered by this specification.
- No extra payment will be made for plant equipment, materials required by the contractor to complete the work.
- The Contractor shall provide all rigging, cranes, lifting equipment, etc. necessary to execute the works.

8 MAINTENANCE TOOLS

- The Contractor shall provide one set of all special tools, gland keys, valve keys, etc. required for testing, maintaining and operating of all items of equipment.
- Duplicate keys shall be provided for all control panels, instrument locks, safety valve locks, etc.
- All special tools etc. referred to above shall be handed to the client when the system handover is done.

9 STORAGE OF EQUIPMENT AND MATERIALS

- The Contractor shall ensure that all stored materials and equipment are safely stacked and that they are not damaged by stacking.
- The Contractor shall ensure that stored materials and equipment do not overload the structure of floor construction.
- The storage of combustible materials on site shall be kept to a minimum. The Contractor shall be responsible for ensuring that such combustible materials are safely stored. Suitable fire fighting equipment shall be provided by the Contractor, who shall further ensure that staff capable of using the equipment are at hand.

10 LOCATION OF EQUIPMENT

- The Contractor shall check on doorways, passages, openings, lifts, etc. provided and shall ensure that all equipment offered can be moved through them to its final position. If necessary, equipment shall be ordered in a partially dismantled condition so that is suitable for moving through the restricted openings or areas of restricted height or areas of restricted load.

11 PROGRAMME AND PROGRESS

- The Contractor shall provide a detailed programme for the complete works within 14 days of appointment. The programme for the carrying out of the works shall be submitted in detailed form covering all significant operations and shall be in the form of a bar chart.
- The Contractor shall liaise with all necessary parties (other contractors, sub-contractors, consultants, equipment suppliers, etc.) to ensure that the programme is as accurate and as realistic as possible.
- The Contractor shall submit the programme in a format agreed with the Principal Contractor and the engineer.
- The programme shall list each scheduled item of equipment in the contract and shall indicate periods for:

    - Preparation, approval and finalisation of manufacturing drawings.
    - Ordering
    - Manufacturing
    - Inspection and testing during manufacture.
    - Delivery
    - Installation
    - Testing
    - Commissioning

- The Contractor shall build into the programme a period of two weeks for approval of drawings by the Engineer.
- The Contractor shall allocate to a senior member of his staff the duties of studying and evaluating the works in relation to the approved programme, of devising methods to overcome or prevent delays and of co-operating with the Engineer and other contractors working on site. He shall report to the Engineer and draw his attention timeously to anything which may cause a delay in the execution of the works.
- The programme shall be updated as and when necessary to take account of changed circumstances.

12 CO-OPERATION WITH OTHER TRADES

- The Contractor shall ascertain the extent of the work of other trades on site.
- The Contractor shall give all necessary assistance to other trades to ensure that the work of all trades can be installed satisfactorily and without delay.
- The Contractor shall liaise with other trades working in close proximity to the work covered by this specification and shall assist in working out equipment and material positions to ensure that all trades can complete their work satisfactorily.

13 BUILDERS WORK

- The successful tenderer shall, within 14 days, or any shorter period which may be necessitated by the construction programme, submit two copies of all drawings showing all builders works required for the project.
- The drawings shall provide the builder with all the dimensions, details, etc. for the work to be carried our correctly.
- The Engineer will scrutinise the drawings and request changes and adjustments as required. After such changes are satisfactorily made, the Engineer will fix his stamp of approval to the drawings.
- The successful tenderer shall provide all the necessary copies of the drawings to the Engineer for issue to all parties.
- It is the responsibility of the Contractor to check the builders work as it is completed to ensure that the work has been correctly carried out in accordance with the drawings. The Contractor shall point out any problem areas as soon as possible to the builder so that they can be rectified. No claims shall be considered for delays or other additional costs which arise out of the contractors failure to check the builders work in good time.
- The builders work drawings shall be fully dimensioned and shall include the following:

    - details of all plant bases required.
    - positions of all drain points.

- details of all openings in walls and concrete work
- details and positions of all equipment to be built into walls.
- any other work required.

- All areas where the Air Conditioning and Ventilation Installation pierces waterproofing shall be carefully detailed by the contractor and builder to the approval of the Engineer and Architect. All necessary sleeves, caulking and flashing as required to make the installation waterproof shall be provided as part of this contract.

14 SUPERVISION AND SITE ORGANISATION

- For the full duration of this Contract, the Contractor shall employ at least one good and competent Supervisor careful and skilled in all aspects of the trades and skills required by this Contract. This supervisor shall be on site whenever work associated with this contract is being carried out and shall at all times be available to attend to queries by the Principal Contractor or Engineer.
- The supervisor shall be the contractor's authorised representative for the project and on site and shall be available to attend progress meetings when called upon to do so by the Principal Contractor, Engineer or Architect whether or not these take place prior to work actually starting on site.
- The supervisor shall be empowered to make all decisions necessary for the execution of the contractor.
- The supervisor shall not be transferred from his position unless on the express instructions of the Engineer.
- The contractor shall at all times have on site copies of all relevant drawings as well as a copy of the specification. The contractor shall institute the necessary procedures to ensure the drawings on site are the latest drawings and that all superseded drawings are removed from site.

15 DRAWINGS

- The Engineers drawings for the contract shall be those issued at the time of Construction together with any others issued to cover the variations to the contract.
- As part of this contract the Contractor shall provide the following drawings:

Manufacturing and Installation Drawings:

The manufacturing and installation drawings ("shop drawings") shall provide all details of the plant necessary for the manufacture and installation of the system in accordance with this specification.

Wiring Diagrams:

The wiring diagrams shall provide details of all the electrical wiring associated with the Air Conditioning and Ventilation Installation. The same drawing symbols and system shall be used as used in the Engineers drawings.

Builders Work Drawings:

All necessary builders work drawings as described elsewhere in this specification shall be provided as part of this Contract.

Record Drawings:
On completion of the installation but before the plant is handed over, the Contractor shall provide a complete set of drawings showing the completed installation including wiring.

- In addition to the drawings listed above the Contractor shall provide all drawings necessary for the execution of the Contract and shall submit such general and detailed drawings of the plant and apparatus as the Engineer may require to approve construction of the plant.
- Details and drawings of all major items of equipment made by the Contractor or his suppliers shall be submitted for approval without specific request from the Engineer.
- All required drawings shall be submitted to an agreed programme to suite the construction of the plant.

- All drawings shall be clearly numbered or marked with the equipment item numbers, area references, etc.

- **Approval of Drawings:**

  - The Contractor shall submit for approval, in principle, copies of all above mentioned drawings prior to starting work or issue to other parties. Any work started (off site or on site) prior to receiving the Engineers approval of drawings shall be at the Contractors own risk.
  - The Engineer may require from the Contractor further detailed drawings and/or calculations which clarify features not adequately shown on the layout drawings. The request for additional details shall not be construed as extending the scope of this contract or altering the programme.
  - The Contractor shall submit two copies of each drawing to the Engineer for approval.
  - The Engineer will return to the Contractor within ten working days of their receipt by him, one copy of each drawing marked "APPROVED IN PRINCIPLE" or marked with any changes which are necessary.
  - The Contractor shall modify the details and drawings as required by the Engineer. The nature and date of each modification and a distinguishing symbol shall be added and the drawings submitted again for approval.
  - Alterations to drawings by the Engineer are not intended to change the scope of work unless explicitly stated as doing so. Should any alterations, in the opinion of the Contractor, change the scope of work the Contractor shall notify the Engineer immediately on receipt of the altered drawings before any further drawing work or fabrication is carried out. Claims for a change of scope, made after performance of the work, constituting the claimed change of scope will not be considered.
  - The approval in principle of drawings by the Engineer shall not relieve the Contractor of any responsibility in terms of the contract. The Engineer will check the drawings for design only and approval of the drawings, schedules and catalogues shall not be construed as a complete check.
  - The Contractor shall be responsible for any discrepancies, errors or omissions in the drawings and other particulars supplied by him whether such drawings or particulars have been approved by the Engineer or not, provided that such discrepancies, errors or omissions are not due to inaccurate information or particulars furnished in writing to the Contractor.
  - Five copies of the Final Manufacturing and Installation Drawings shall be issued to the Engineer by the Contractor within ten days of receipt of approval in principle. Further copies shall be provided as may be required by the Engineer either before or after final approval.
  - The Contractor shall provide at his own expense, all copies of drawings by him in the execution of the work and shall also, at his own expense, supply to the Engineer such drawings and copies thereof as are provided for in the specification.

- **Record Drawings:**

  - On completion of the installation, but before final handover, the Contractor shall provide two hard copies and one soft copy (USB) of each of the following drawings showing the services as fixed:

    - Complete 1 : 50 scale layout of pipework inside plantrooms.
    - Large scale (at least 1:50) details of plantrooms.
    - Complete 1 : 50 scale drawings of the whole installation.
    - Detailed drawings of all items of plant.
    - Electrical layouts and wiring diagrams.
    - Details of any other items requested by the Engineer.

  - The drawings shall be sufficient in detail to enable the Employers staff to maintain, dismantle, reassemble and adjust all parts of the works.
  - The layouts shall show the location of all manual and automatic valves, controls, control panels, outlets, etc.
  - A copy of the wiring diagram shall be mounted in the Plant room in a glass fronted frame. The diagrams shall be printed by a non-fading process.

16 MAINTENANCE AND GUARANTEE

Maintenance

- The Contractor shall maintain the entire installation as described in this specification for a period of one year from the date of final handover.
- The maintenance visits shall be carried out at regular monthly intervals.
- The maintenance shall cover all items of plant and equipment and shall include replacement of all expendable items, e.g. drive belts, fuses, filters, etc.
- In addition to the monthly maintenance visits, the Contractor shall carry out all necessary visits due to failure of any item of the plant or equipment. The contractor shall attend to all complaints by the Employer.
- The Contractor shall report to the Owners nominated representative, both on arriving and leaving the site. The Contractor shall provide the Owner and the Engineer with a Service Report for each visit whether scheduled or breakdown.
- At each maintenance visit, the Contractor shall check the function of each item of plant and equipment and shall ensure that the plant is performing to specification. All automatic controls and bulbs, etc. shall be checked and adjusted or replaced as necessary.
- The equipment and plantrooms shall be cleaned at each scheduled visit.
- The Contractor shall notify the Engineer prior to the final monthly service so that the Engineer may accompany the Contractor.
- The Engineer may at his discretion allow he maintenance period on any item of equipment or section of the installation start at a date prior to final handover if it is put into operation for beneficial use of the owner prior to final handover. This will not be permitted in cases where final handover is delayed due to the Contractor not carrying out remedial work in good time.

Guarantee

- The Contractor shall guarantee the entire installation as described in this specification for a period of one year from the date of final handover. The guarantee shall provide that all pats, spares, equipment that becomes defective during the guarantee period shall be replaced free of charge. The guarantee shall cover all costs including material, labour, overheads, travelling etc.
- The complete installation shall be guaranteed against defects whether patent or latent as well as against faulty materials and workmanship.
- The guarantee shall cover all materials, plant and equipment whether or not it is covered by a manufacturers guarantee. The one year guarantee in terms of this contract on the entire installation shall not be affected by the prior expiry of any guarantee provided by the manufacturer of any item of equipment or plant.
- The Contractor shall cede to the Owner the remainder of any equipment guarantee which he has received from his suppliers and which extends beyond the one year period. It shall be the responsibility of the Contractor to ensure that the guarantee is transferable.
- The Engineer may at his discretion allow the guarantee period on any item of equipment or section of the installation start at a date prior to final handover if it is put into operation for beneficial use of the Owner prior to final handover. This will not be permitted in cases where final handover is delayed due to the contractor not carrying out remedial work in good time.

17 OPERATING AND MAINTENANCE MANUALS

- The Contractor shall provide three copies of the Operating and Maintenance Manuals.
- The Contractor shall submit for approval to the Engineer, four weeks before completion of the installation, two copies of the maintenance and operating manuals for the plant and equipment supplied. The contract will not be accepted for handed over until the Operating and Maintenance Manuals are approved.
- The Engineer will return to the Contractor within ten working days of their receipt by him one copy marked with all changes which are necessary.
- The Contractor shall modify the manuals as required by the Engineer and submit to the Engineer, within ten working days, two revised copies of the manual. On completion of the installation, but before the plant is handed over to the Employer, the Contractor shall provide three copies of the final Operating and Maintenance Manuals for the plant and equipment supplied. The manuals shall be bound in book form with hard plastic covers to withstand constant use.

- The manuals shall be properly indexed to facilitate easy reference.
- The manuals shall include:

    - A list of recommended servicing tools and specialist equipment.
    - A list of spares to be supplied by the Contractor to cover the period of warranty.
    - A priced list of recommended spares necessary for a period of 2 years in operation.
    - Exploded drawings or detailed spares list from which every item of every piece of equipment can be positively identified for ordering replacements.
    - A list giving the name and address of the local agent of each item of equipment.
    - A list giving the name and address of the manufacturer of each item of equipment.
    - A copy of all test certificates obtained with the plant.
    - A list of recommended lubricants.
    - A preventative maintenance programme for all equipment.
    - Operating instruction for each item of equipment.
    - Performance date and/or characteristic curves.
    - Commissioning data.
    - Record drawings.

SECTION 2 PART 1.1

CABLE INSTALLATION AND ACCESSORIES

1 GENERAL

- The installation of cables for distribution of power in buildings, structures and in the ground for system voltages up to 11000 volt, 50 Hz, comprise the following:-

2 Cable Types

- The following cable types shall be used, unless specified to the contrary in the detail technical specification:

    - Low voltage supplies in ground: PVC insulated armoured.
    - Low voltage supplies in Substation: PVC insulated armoured
    - Low voltage supplies to main distribution boards and sub-distribution boards: PVC insulated armoured, Unarmoured PVC insulated cables may only be used for supplies to sub-distribution boards if such cables are installed in conduit, sleeves or metal trunking.
    - Connections to equipment: PVC insulated armoured or unarmoured when installed in conduit or metal trunking.
    - Cables with copper conductors shall be used throughout. All cable installations shall conform to the SABS Code of Practice 0142 : 1978.

3 Routes

- Cables shall be installed in the positions indicated on the drawings. Deviations are to be pointed out to the Engineer before installation commences.
- Cable routes, or portions thereof, may be altered in advance of laying cables. Price adjustment, in respect of additional work shall be at the documented rates.
- Obstructions along the cable routes shall be brought to the attention of the Engineer.

4 INSTALLATION OF CABLES IN CONCRETE TRENCHES

Installation

- Cables shall be installed in concrete trenches in one of the following ways:

    - On horizontal cable trays.
    - On horizontal metal supports with suitable clamps, or
    - On vertical cable trays or metal supports fixed to the side of the trench. Cables shall be clamped in position.

- Cables shall not be bunched and laid on the floor of the building trenches.

Covers

- The covering of concrete trenches shall as a rule fall outside the scope of the electrical installation. The Contractor shall however be responsible for the cutting or drilling and smoothing of holes for cables through chequer plates, concrete or other covering as required.

Filled trenches

- Floor trenches shall be filled with sand only when it is a specific requirement of the Local Authorities.
- If a sand filling is required the cables shall be fixed to non-corroding supports.
- Sand-filled trenches if required shall be covered as follows:-

- Reinforced concrete covers
- Sand and cement screed or
- Removable chequer plates.

- Method 1 above shall be used where vehicular traffic may be encountered over trenches, in which case the covers must be designed to withstand the predetermined mass.

5 FIXING OF CABLES TO TRAYS OR STRUCTURES

Installation

- Cables may be installed in one of the following ways:
-
  - on horizontal cable trays,
  - against vertical cable trays with suitable clamps,
  - against horizontal or vertical metal supports or brackets with suitable clamps, or
  - on clamps which are fixed to the structure.

- Cable trays installed between steel columns must be supported by means of vertical suspension rods to prevent the tray from sagging or warping.

Clamps

- Suitable clamps (cleats) which will secure cables without damage shall be used. Clamps shall consist of adjustable metal wings which clamp to a metal support, or consist of two halves bolted together. The correct clamp size to fit the cable shall be used. Cables of different sizes may only be fixed by a common clamp when the clamp is specially made to accommodate the various cables.

Spacing of Supports

- The maximum spacing between cleats (clamps) to which cables are fixed in horizontally and vertical routes shall be determined from Table 1 below. Additional cleats shall be installed at each bend or offset in the cable run. Spacing of supports for cables for high voltage lighting shall be in accordance with Table 8 of SABS 0142.

TABLE 1

Cross Sectional Area of Cable Conductors (sq.mm)	Maximum spacing of supports (cleats) (mm)			
	Armoured Cables		Unarmoured Cables	
	Horizontal Cable Routes	Vertical Cable Routes	Horizontal Cable Routes	Vertical Cable Routes
1.5 4 core	450	750	300	400
2.5 4 core	450	750	300	400
4.0 4 core	600	750	300	400
6.0 4 core	600	750	300	400
10.0 4 core	750	900	400	450
16.0 4 core	750	1000	400	550
25.0 4 core	900	1000	450	550
35.0 4 core	900	1000	450	550
50.0 and above	900	1000	450	550
Multi core	30 X outside dia with max of 900 mm		20 X outside dia with max of 550mm	

Spacing correction factors

- Cables shall be spaced apart. Should this not be possible, the grouping correction factor, according to SABS 0142 shall apply.

Cables on Different Levels

- Where parallel cable runs are installed at different levels (e.g. on parallel cable trays) a minimum spacing of 300 mm shall be maintained between each level.

High Voltage Cables

- High voltage cables shall be separated from other cables and services throughout the installation and shall as far as possible be installed in separate floor trenches, pipes or metal channels. Where this is not feasible a minimum spacing of 300 mm shall be maintained.

Cables for other Services

- Cables for telephones, communication systems and other low voltage systems (less than 5O V) shall be separated from power cables. In vertical building ducts a physical barrier shall be provided between power cables and cables for other services. Where armoured cables are used for such other services, they shall be installed on separate cable trays or shall otherwise be at least 300 mm away from power cables. Where unarmoured cables are used for these other services, they shall be installed in separate conduits or metal channels.

6 TERMINATION OF CABLES

General

- Cable ends shall be terminated with glands and the associated accessories such as clamps, shrouds, etc. conforming to the requirements of SABS 0142.
- Connection of cables to switchgear shall always be effected in such a way that the various phases, seen from the front of the switchgear will be in the following positions:

No. 1 conductor : left (red) (A)
No. 2 conductor : centre (white) (B)
No. 3 conductor : right (blue) (C)

- Cable cores shall be marked with coloured tape where necessary to identify the phases, but standard phase colours are preferable.
- The current-carrying capacity and breakdown voltage of the cable end shall be the same as for the complete cable.

PILCSTA and PILCSWA Cables

- Paper insulated cables shall be manufactured in accordance with SABS 597.
- Cable end boxes shall comply with BS 542 and the filling compound to BS 1858.
- The ends shall be terminated in cable end boxes filled with bituminous cold filling or resin oil semifluid compound or heat shrinkable terminations in accordance with the specification, and to the manufacturer's recommendation.
- Before terminating or jointing PILCSTA and PILCSWA cables a test to establish the presence of moisture must be carried out. The test procedure must be forwarded to the Engineer for approval.
- The armouring shall be bonded to the main earth bar of the switchgear or transformer, but the bond shall be easily removable for testing purposes.
- All cut cable ends which will be exposed to the atmosphere for more than two hours shall be sealed and wiped to prevent penetration of moisture.

PVC Insulated Cables

- PVC insulated cables shall be manufactured in accordance with SABS 150.
- PVC cable glands shall be made of nickel plated bronze or brass and must consist of a barrel carrying a cone bush screwed into one end and a nickle-plated brass nipple and galvanised steel lock nut on the other end.
- Flameproof glands shall comply with SABS 808 groups 1, 2a and 2b.
- All cable ends shall be terminated with approved glands ensuring a watertight connection between the sheath, gland and equipment. In cases where copper ECC earth conductors are jointed to the armouring special glands adhering to SABS 150-1970 paragraph 5.8.3(c) shall be used for ECC cables.
- The glands to be used shall be constructed so that the armouring of the cable is clamped between two beveled cores with a screw-clamp, with the cable gland screwed to the gland plate or equipment and fixed with a lock nut.

- A Neoprene or PVC shroud of the correct size shall be used to seal the gland and sheath watertight.
- Cable ends shall be supplied with the necessary earth connection.
- A supporting channel or other approved means of support shall be provided to remove mechanical stress from the cable glands.

XLPE Cables

- Cable ends shall be terminated strictly in accordance with manufacturer's specifications. The termination shall withstand the same test voltage as the rest of the cable.
- Termination for high voltage XLPE cables must have a satisfactory stress relief in order to keep the partial discharges extinguished.
- Outdoor termination must be able to withstand air pollution and bad weather without any signs of surface current tracking.
- Taped or prefabrication terminations may be used, in accordance with the manufacturers recommendation.

JOINTS

- No joints in cable runs will be allowed unless a cable run exceeds the maximum length available on a cable drum.
- Jointing shall be carried out strictly in accordance with the manufacturer's instruction and by personnel competent in jointing the types of cables used.
- The joint shall not impair the anti-electrolysis characteristics of the cable.
- The Contractor shall notify the Engineer timeously of the day on which jointing is to be carried out in order that an inspection may be arranged if so required. Any cable joint not inspected by the Engineer because of insufficient notice being given, shall be opened for inspection and redone at the discretion of the Engineer and at the cost of the Contractor.
- Joints shall be fully water and air tight and shall be free of voids and air pockets.
- The crossing of cores in joints will not be permitted under any circumstances.

7 CONNECTION OF CABLE CORES

- Suitable lugs shall be used, preferably crimped to cable core ends using mechanical or pneumatic tools designed for this purpose
- Cables that are connected to clamp type terminals where the clamping screws are not in direct contact with the conductor, need not be lugged but the correct terminal size shall be used.
- Contact surfaces shall be thoroughly cleaned and smoothed and fixing bolts shall match the hole size of the lug.
- Ferrules shall be used as far as possible where cable cores are connected directly to equipment with screws against the conductor strands.
- When cutting away insulation from cable cores to fit into lugs, care shall be taken that no strands are left exposed. Under no circumstances may any of the conductor strands be cut away to fit into lugs.

8 TESTING

- Each cable shall be tested after installation SABS 150 (Up to 1000V) and SABS 97 (Up to 11 requirements of the Local and Supply Author
- LV Cables shall be tested by means of a suitable megger 1000V and the insulation resistance shall be tabulated and certified.
- HV. Cables shall be pressure tested in accordance with the following table and the exact leakage current shall be tabulated and certified.

Cable rating (volts)	**Test Voltage (Applied for 15 minutes)**			
	Between conductors		**Conductors to sheath**	
	AC (r.m.s.)	**DC**	**AC (r.m.s.)**	**DC**
3300	6000	9000	3500	5000
6600	12000	18000	7000	10500
11000	20000	30000	11500	17000

- The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The costs of testing must be included in the tender price. The tests are to be witnessed by the Engineer after timeous notification by the Contractor.
- On completion of the tests on any cable, the Contractor shall with-out delay, submit three copies of the certified Test Reports to the Engineer.

9 CABLE TRAYS AND LADDERS

- Cable trays and ladders shall comply with SABS 763 with respect to finishes. PVC trays shall be rigid unplasticised.
- The Contractor shall supply and install all cable trays and/or ladders as specified or as required including the necessary supports, clamps, hangers, fixing materials, bends, angles, junctions, reducers, T-pieces etc. He shall further liaise with the Main Contractor for the provision of holes and access through the structure and finishes.

Supports

- Trays shall be supported at the following maximum intervals:
- 1,6 mm thick metal trays with 12 mm return 1m spacing
- Metal trays with folded over return and 50 mm upstand 1.22 spacing
- 2,4 mm thick metal trays, and 75 mm return 1.5m spacing
- Metal cable ladders other than SCALLADDER 1.5m spacing
- SCALLADDER or similar 1.0 spacing
- 3,0 thick PVC trays with 40 mm return 1.0m spacing
- 4.0 mm thick PVC trays with 60 mm return 1.5m spacing
- In addition trays and ladders shall be supported at each bend, offset and T-junction. The above spacing of supports are applicable to both vertical and horizontal installation of trays and ladders.

Joints

- Joints shall be smooth without projections or rough edges that may damage the cables. The Contractor will be required to cover joints with rubber cement or other non-hardening rubberized or plastic compound if in the opinion of the Engineer joints may damage cables. Joints shall as far as possible be arranged to occur at supports. Where joints do not coincide with supports, joints shall in the case of trays with single returns be made by means of wrap-around pieces of the same thickness of the tray and at least 450 mm long. The two cable tray ends shall butt tightly at the centre of the splice and the splice shall be bolted to each cable tray by means of at least 8 round head bolts, nuts and washers.

  Splices shall have the same finish as the rest of the tray. Where joints which do not coincide with supports occur in trays with folded over returns, tight fitting metal guide pieces, at least 450 mm long, shall be inserted in the folded return to provide the necessary support to the two cable tray ends. Splices as described above shall be provided at joints which do coincide with supports if the loaded tray sags adjacent to the joint due to the interruption of the bending moment in the tray.

Fixing

- Trays and cable ladders shall be bolted to supports by at least two round head bolts per support. Bolts shall be securely tightened against the tray surface to avoid projections which might damage cables during installation.

Fixing to the Structure

- The supports for cable trays and ladders shall in all cases be securely fixed to the structure by means of heavy duty, expansion type anchor bolts. Cantilevered trays shall be supported at two points with a minimum of 2 expansion bolts per support. It is the responsibility of the Contractor to ensure that adequate fixing is provided since cable trays and ladders that work loose shall be rectified at his expense. The fixing shall take into account site conditions that prevail during installation.

Earthing

- Metal trays and ladders shall be bonded to the earth bar of the switchboard to which the cables are connected. Additional bare copper stranded conductors or copper tape shall be bolted to the tray or ladder where the electrical continuity cannot be guaranteed. These additional conductors or tapes shall always be installed in all outdoor applications and in coastal regions.

Expansion Joints

- Where cable trays/ladders have to cross expansion joints, the trays/ ladders must form a gap of at least 25 mm between the two sections. Cables installed across expansion joints, must have enough slack to accommodate the expansion of the building.

SECTION 2 PART 1.2

FIXING MATERIALS FOR ELECTRICAL SERVICES

1 GENERAL

- This section covers the general requirements for fixing materials forming part of the electrical installation.

2 Responsibility

- It is the responsibility of the Contractor to position and securely fix conduits, ducts, cables and cable channels, switchboards, fittings and all other equipment or accessories as required for the instillation. The Contractor shall provide and fix all supports, clamps, brackets, hangers and other fixing materials.

3 Finishing

- All supporting steelwork installed by the Contractor shall be wire brushed and given one coat of rust-resisting primer, followed by one coat of high quality enamel paint before any other equipment is fixed.

4 Welding

- Supports, brackets, hangers, etc. may only be welded to steel structural members where prior permission of the Engineer has been obtained.

5 Screws and Bolts

- Equipment with securing holes shall be fixed with bolts and fixing screws as specified. Where sizes are not specified, the largest bolt or screw that will fit into the hole shall be used.

6 Wall Plugs

- Where the fixing holes in brick or concrete walls are smaller than 10 mm dia. any where the mass of the equipment is less than 15 kg, wall plugs may be used to fix conduits, cables and other equipment. Aluminium fibre or plastic plugs only may be used. Wooden plugs are not acceptable. Plugs installed in seams between bricks are not acceptable. A masonry drill of the correct size shall be used to drill holes for plugs. Round-headed screws of the correct diameter to match the specific plug shall be used throughout.

7 Anchor Bolts

- Where the fixing holes are 10 mm and larger or where the mass of the equipment is 15 kg or more, equipment shall be fixed by means of expanding anchor bolts or by means of bolts cast into the concrete or built into walls.

8 Galvanised Equipment

- Brass screws, bolts and nuts shall be used to fix galvanised equipment.

9 Shot-Fired Fixing

- Materials such as metal cable ducts or channels may be fixed against wall and concrete slabs by means of the shot-fired method designed for this purpose.
- The Contractor shall ascertain whether this method of fixing will carry the weight of the material including conductors, cables and other items of equipment to be installed later. Should it be found that the method of fixing is inadequate and joints tend to loosen the Contractor will be required to fix the material by an alternative method to the satisfaction of the Engineer.

- Where the shot-fired method is used warning signs shall be placed at all entrances leading to the area where this work is in progress. The Contractor shall take all reasonable precautions to prevent accidents. Nails recommended by the manufacturer of the shot-fired equipment shall be used. Refer to clause C49 of Factories, Machinery and Building Work Act.

10 Clamps and Brackets

- Clamps and brackets used to fix or support equipment such as cable trays, ducts, etc. shall be of a purpose made type suitable for the specific application. Specially made brackets or clamps may only be used after approval of the Engineer has been obtained.

SECTION 2 PART 1.3

STANDARD SPECIFICATION FOR AIR FILTERS

1 GENERAL

- Only filter units shall be acceptable which can be shown to the satisfaction of the Engineer to be the standard products of a reputable manufacturer, regularly engaged in the fabrication of the particular type of air filter. If an imported product, the sub-contractor shall be able to prove that such products are well represented in the Republic of South Africa.
- Only filters tested by the South African Bureau of Standards to the ASHRAE Standard 52-68 will be acceptable. Arrestance (gravi-metric), efficiency (photometric), dust holding capacity and resistance against air velocity shall be documented according to the above test.
- Frames and filters shall be constructed in such a manner that the passage of unfiltered air is prevented. Gaskets shall be provided between filters and frames and filter frames unit casing.
- Each filter bank shall be supplied with an identification label stating the type of filters, quantity of filter elements, model numbers and all other information necessary for reordering filter material.
- Filters shall be adequately protected against dirt during construction and shall not be operated until the system is thoroughly cleaned. Filters must be put in regular operating condition before the fans which they connect are operated for any purpose.
- An inclined manometer shall be made with copper tubing. The full gauge shall be connected to static pressure taps of approved design so that it will indicate correctly the resistance of airflow to the filter. Connections shall be installed on each filter bank. The scale reading of the inclined manometer shall be between 30 and 60 percent higher than the change-out pressure of the filters.
- All filters other than automatic types shall be provided with pressure differential switches which shall operate when the pressure drop across the filter reaches a value recommended by the manufacturer. The switch shall energize a pilot light on the main control board.
- Filter dimensions shall be selected to suit the configuration of the air handling unit.
- All filter accessories including the filter holding frames and clips shall be standard products of the filter manufacturer.
- All metal parts shall be sufficiently protected against corrosion.
- All metal parts shall be coated with baked enamel or equivalent paint.

2 PANEL FILTERS

- Each filter bank shall consist of a factory made robust sectional steel supporting frame, which shall accommodate the filter cells.
- All filter cells on the same project shall have the same dimensions.
- Filter cells shall be easily removable from the upstream or down-stream side of the filter.
- The filter medium shall be pleated and bonded to the media holding frames.

3 AUTOMATIC ROLL FILTERS

- Filters shall be of the automatic renewable medium type, in which a roll of medium is unwound across the airstream by a mechanism controlled by the air pressure drop through the medium.
- All factory wiring shall be run in rigid conduit terminating in fittings suitable for the location.
- The differential pressure control shall be adjustable to any cut in and cut out pressures from 50 Pa to 150 Pa with a pressure differential from 10 to 20 Pa. Initial adjustment shall be as prescribed by the media manufacturer.
- Filters shall be provided with suitable means to stop the travel of the medium when the end of the roll is reached and operate a visual signal on the main switchboard to indicate the need for renewal.
- The replaceable filter medium shall be freely available from stocks in South Africa in minimum lengths of 15 meters.

4 FILTERS

- Filter frames and retaining mechanisms shall be supplied and in-stalled by the filter manufacturer.
- The filter to frame seal shall be a routed fluid seal. The sealing fluid shall be a silicon type, be highly viscous, non-solidifying and shall not support bacteria or bacteria growth. The sealing fluid shall be selected for the particular application.
- The filter material shall be water repellent.
- The filter media enclosing frame shall be corrosion protected steel.
- The complete filter installation shall be leak tested by the filter manufacturer. The leak test shall be either a DOP or sodium flame test.
- The filter efficiency of each filter cell shall be tested and certified.

5 GREASE ELIMINATORS

- Grease eliminators shall be 316 stainless steel Uys Engineering panels or equal. a V-formation.
- The unit shall be made up of interlocking frames for the individual filter units, or bolted in a common assembly. The ends of the assembly shall be suitably blanked off.
- Each pair of filter units shall be provided with a readily re-movable drip tray.
- Filters shall be fitted with suitable handles.
- The filter depth shall not be less than 50 mm.

6 SPARE MEDIA

- One complete set of spare filter media shall be supplied for all the filters on the entire project.
- Spare filter media shall be suitably packed and protected for storage. The packing shall withstand the normal handling procedures without damage to the filters.

SECTION 2 PART 1.4

GENERAL TECHNICAL SPECIFICATION

DX SELF CONTAINED & DX SPLIT AIR CONDITIONING UNITS

1 GENERAL

- Room type air conditioners must be completely self-contained units of the direct expansion unitary or split type design, air cooled. The air conditioners must generally be in accordance with SABS 1125 with sound levels not exceeding 45 dBA or as specified in the Project Specification. Unless otherwise specified all units must be of the inverter reverse cycle type.

- Evaporation units must be equipped with a suitable and easily accessible filter, three speed fan, adjustable directional air discharge grille, control thermostat which, must be installed in the return air path of the unit, drain-pan, drain piping and cooling coil. In addition to this all controls, control panel and complete wiring, including interlocking with outdoor unit must be part of the unit.

- The outdoor unit must contain the matching compressor unit, air-cooled condenser, condenser fan within a waterproof painted and corrosion protected casing.

- The indoor/outdoor units must be interconnected with refrigerant piping (separately insulated suction and delivery piping for reverse cycle units), electric wiring and interlocking control cabling. Refrigerant piping and cabling must be installed inside a galvanised sheet steel trunking for external runs and PVC trunking for internal runs. These must be neatly installed and painted if specified.

- Make provision for the drainage of excessive condensate to the nearest building drain by means of copper or uPVC tubing of no less than 25mm diameter. Provide units with factory mounted condensate pumps where required.

- For inverter reverse cycle heating units, including split type units, provide a proper stainless steel drip pan with drainage piping for the indoor units.

- Use copper for external drainage and uPVC for internal drainage and where drain piping is installed inside galvanised trunking.

- Surface mounted copper drain piping must be secured to the wall by means of copper or brass saddles at no more than 2 meter intervals.

- Where drainage piping is required to be installed flush mounted, positioning and chasing must be done in good time to meet construction programmes

- All external panels must be neat fitting with hard wearing exposed surfaces of baked enamel or equal finish of approved colour.

- Provide electrical interlocking to ensure that:
    - Compressor cannot run without both indoor and outdoor fans running.
    - Electric heating elements can only be switched on if the indoor fan is running.
    - It shall not be possible to switch cooling and heating on simultaneously.

- Room type air conditioners must be derated to accommodate altitude, refrigerant pipe lengths and design conditions specified in the Project Specification. Contractors must provide proof of derated capacities with their submission. All capacities specified are to be achievable at medium evaporator fan speed.

- The units must be of a well-known manufacturer and spares must be freely available in South Africa. In selecting units, it must be ensured that the selections fit into the areas allocated.

2 WINDOW TYPE UNITS

- Window type room air conditioners must be suitable for mounting in window frames or wall openings and must be completely self-contained.
- The units must be made up in two parts namely the chassis or cabinet and the main body. Mount the cabinet in the window frame or wall. The main body must slide in/out on self-locating guides and guide strips to facilitate maintenance.
- Where a unit is installed beyond normal reach the controls must be installed remotely at eye level. Unless otherwise specified in the Project Specification all wiring between the unit and the remote control must be installed in flush conduit and draw-boxes.

3 CONSOLE TYPE UNITS

- Unless otherwise specified on the drawings or in the Project Specification, install units through a wall with a steel sub-frame built in to the wall and neat finishing architraves inside and outside. The external architrave must be of aluminium angle and must be mitred at corners and must cover the sub-frame and opening completely. Seal the architrave and sub-frame surround with clear silicone sealant. Units are to consist of a two part construction allowing the sub-frame to be built in to the wall with the main body sliding in and out.
- Console units must be completely self-contained. Mount above skirting height in the position as detailed on the project drawings.
- Provide matching weather tight air intake and exhaust louvered panels of anodised aluminium with horizontal blades and install with each unit. Submit louvers to the engineer for approval prior to ordering. Louvers must be to the supplier's approval. Depending on size, detail and wall thickness the louver must form part of the cabinet or must be fixed to the sub-frame.
- Slinger ring type drainage water disposal may be considered in lieu of conventional pipe drainage system if specified in the Project Specification. There must be no condensate carry over, even in high humidity conditions.

4 SPLIT TYPE UNITS

- Split type units must consist of a direct expansion indoor fan coil unit and a separate (remote) externally located air-cooled condensing unit.
- The indoor fan coil unit may be floor-mounted, wall mounted, under-ceiling mounted, ceiling-cassette mounted or above ceiling ducted type as specified in the Project Specification.
- Above ceiling units must be properly insulated, particularly where exposed to roof or lighting heat loads.
- Remote controls must be wired in conduit and mounted at eye level in the positions indicated on the drawings. Controllers must be of the digital type and must be hard wired or of the remote wireless type. Any additional controller functions are specified in the Project Specification.
- Install all conduit and draw boxes flush in the walls or partitions in new buildings. Use surface mounted PVC trunking in existing buildings. The PVC trunking and control units of hard wired units must be screwed to the wall. Gluing is not acceptable.
- No joints are allowed in the control wiring.
- Insulate suction and delivery lines separate and tape joints on insulation to create a vapour barrier.
- Install outdoor units on raised plinths or where wall mounted, on robust galvanised steel brackets, properly braced and fixed with suitable wall anchors to the satisfaction of the Engineer. Install units as per the manufacturer's recommendations.
- Surge refrigerant piping and fit with the necessary oil traps strictly in accordance with the manufacturer's requirements.

SECTION 2 PART 1.5

STANDARD SPECIFICATION FOR AIR DUCTS

1 GENERAL

- Ducting shall be manufactured according to SABS 1238-1979 as amended.
- All duct dimensions, including dimensions for internally insulated ducts refer to the clean internal cross-sectional area.
- Unless specified, type 316 stainless steel shall be used for stainless steel ducting.
- Opposed blade balancing dampers shall be installed on all branch ducts feeding more than one air outlet.
- Dampers shall not be used to create artificial resistance in the system in order to reduce fan air flow capacity. Reduction of air flow shall be accomplished by reduced fan speed or by changing the fan blade angle.
- All ducts passing through concrete or brick walls shall be isolated from the walls by means of a high density glass fibre collar of at least 20 mm thickness.
- Galvanised steel shall be used for ducting for air conditioning and ventilation unless otherwise specified.
- All exhaust air ducting for moisture producing equipment such as cooling towers or where air is drawn through or over water shall have sealed longitudinal and cross joints and shall be painted on the inside with corrosion protection paint to the satisfaction of the Engineer. Corrosion protection shall be selected to give a minimum protection life of five years.
- Black mild steel of a minimum thickness 1,6 mm thickness shall be used for grease contaminated exhaust systems. All joints shall be welded.

2 DUCT HANGERS

Duct hangers shall be as follows:

Longest Duct dimensions (mm)	Round hangers(mm)	Galvanized Strap hangers (mm)	Shelf Angles	Maximum Spacing(mm)
Up to 760	6	25X1.6	25X25X3	3.0
761-1000	10	25X1.6	38X38X3	3.0
1001-2100	10	25X1.6	50X50X3	2.4
2101-2400	10	25X1.6	50X50X6	2.4
2401 and over	12	25X1.6	50X50X6	2.4

Round hangers shall not protrude below the lowest part of the shelf angles

3 FLEXIBLE DUCT CONNECTIONS

- Flexible connections between ducting and vibrating equipment, or where otherwise specified, shall be fitted with flanges identical to those specified for ducting of the same duty and dimensions.

SECTION 2 PART 1.6

STANDARD SPECIFICATION FOR FANS

1 GENERAL

- Requirements under the above heading apply to fans which are not integral parts of condensing units, cooling towers, air handling units or similar equipment designed and manufactured as complete units by the manufacturer unless referred to.
- Fans shall be statically and dynamically balanced. In the case of direct driven fans the balancing shall be done on the motor/impeller assembly.
- Electrical protection gear characteristics shall be determined by the fan/motor assembly characteristics.
- Fans handling air or gases with abnormal qualities shall be selected for the relevant application.
- Extract fans shall have suitable access doors to allow for cleaning of the inside of the casing and the impeller.
- No fan shall be operated for any purpose, such as temporary ventilation, testing, etc. until the connected ducts have been cleaned and the filters, if any, have been put in regular operation.
- Fans shall be selected to operate in the stable region and as close as possible to the point of maximum efficiency.
- Large fans shall be manufactured in easily assembled parts to facilitate installation. This shall not effect the static or dynamic balance of the fans.
- All finished parts of fans, such as shafts and bearings, shall be properly protected from rust and foreign matter by means of suitable wrappings and protective grease coatings until commissioning of fans.
- The design total fan resistance as indicated in drawings and bills of quantities (BOQ) shall be finally checked when all the information on selected system elements is available.
- Electric motors shall be in accordance with this specification.
- Fans shall be of reputable manufacture and approved by the Engineer.
- Fans shall be selected for the correct air density and temperature.
- All fan accessories shall be the product of the fan manufacturer of the specific fan it is used with.
- Flexible connections shall be fitted with flanges matching those of the fan.

2 Centrifugal Fans

- Bearings shall be of the self-aligning ball or roller type and shall be selected for quiet operation as recommended by the bearing manufacturer. Bearings shall be selected for an average life of not less than 200 000 hours, allowance being made for the dead weight of wheel and maximum belt pull. Should the bearings prove to be noisy during the maintenance period, they shall be replaced by a more suitable type. Only bearings supplied by one manufacturer shall be used on one project of centrifugal fans.
- Fans shall be driven by V-drives,
- V-drives shall be matched sets of ‘Fenner’ or equivalent, V-drives shall be selected with a service factor and additional factors as recommended by the manufacturer. Operation of over 16 hours per day and 4 starts per hour shall be the determining factors. Service factors shall be applied to motor power and not absorbed fan power.
- V-drives shall be installed and operated according to the manufacturer instructions.
- V-belt tension shall be checked and set after two hours of continuous operation and thereafter daily for two weeks of operation.
- The fan and motor shall be mounted on a common frame and means shall be provided to adjust the belt tension.
- Adequately ventilated drive guards shall be provided. Care shall be taken that the motor cooling air is not blown onto or into the drive guards.
- Drive guards shall be constructed to permit maintenance and the use of speed counters with the guards in position.
- Fans shall be supplied with mating flanges.
- Fans with impeller diameters above 750 mm shall be provided with access guards.
- Fans shall be supplied with mating flanges.

- Fans with impeller diameters above 750 mm shall be provided with access doors in the casing.
- All connections to ductwork, plenums, etc. shall be flexible. flexible connections shall be a minimum of 100 mm long and attached to the fan, ductwork, plenums etc. in such a way that it can be removed and replaced without disturbing any of the aforementioned equipment.
- Flexible connections shall be air tight.
- Vibration isolators shall be installed.
- A drainage plug shall be installed at the lowest point of the fan

3 Axial Flow Fans

- Multiple aerofoil blades shall be fitted.
- Blades shall have an adjustable pitch angle.
- Access doors of ample size shall be provided in the casing of long casing fans.
- A weatherproof external terminal box forming an integral part of the casing, shall be provided as standard for motor connections.
- Inlet cones manufactured by the fan manufacturer shall be fitted to fans of which the inlet is not connected to ducting with the same diameter.
- Fans intended for use within ductwork shall be of the long casing type such that the casing completely shrouds the fan and motor assembly.
- Fans having only one end attached to ductwork, plenums, walls etc. shall be the short casing type. The fan shall be so installed that the motor is accessible.
- Anti-vibration mountings shall be utilized.
- Fan selection shall be made ensuring that a stall condition will not occur.
- Vortex dampers shall match the fans and be manufactured by the fan manufacturer.
- Controllable pitch fans shall have electric actuators. To ensure smooth operation throughout the range there shall be a balance between the control force and return force.
- All connections to ductwork, plenums etc. shall be flexible.
- All connections to ductwork, plenums etc. shall be flexible. Flexible connections shall be a minimum of 100 mm long and attached to the fan, ductwork, plenums etc. in such a way that it can be removed and replaced without disturbing any of the aforementioned equipment
- Flexible connections shall be air tight.

4 Propeller fans

- Fans shall be resiliently mounted on rubber cushions or by other approved means.
- Fans shall be direct driven with totally enclosed motors.
- Mounting rings or plates shall be die cast or die formed to smooth curves where the air enters the wheels. Mounting plates shall be heavy enough to prevent distortion and shall be adequately braced to prevent vibration.
- Fans shall be suitable for speed control.
- Speed controllers shall control the speed in steps and be suitable to receive external signals
- Speed controllers shall control the speed in steps and shall be hand operated.

5 Window/Wall type extract fans

- Fans shall be "Woods Xpelair", "Ventaxia", "AMS" or similar approved.
- Fans shall be reversible.
- Fans shall be supplied complete with mounting accessories.
- The shutters shall be closed when fan is not operational
- Fan controllers shall be included. The controller shall be capable of switching the fan on and off, select low or high speed and reverse the motor.

5 Roof Extract Fans

- Roof Extract Fans shall be "Brooks", "Woods" or equivalent factory assembled type.
- Fans shall be selected for quiet operation and shall have ball or roller bearings with dust tight seals.
- All metal exposed to weather shall be corrosion resistant or coated so as to prevent corrosion
- Fans shall include automatic shutters.
- Sound attenuating kerbs shall be provided

SECTION 2 PART 1.7

STANDARD SPECIFICATION

FOR

TESTING AND COMMISSIONING

1 GENERAL

- The Engineer or his representative shall be advised of all testing and commissioning and shall be given the opportunity to witness all tests. However the Engineer will only be on site to witness the tests and takes no responsibility for the acceptance of test results.
- The testing and commissioning procedure shall form part of the Quality Verification Plan submitted by the Contractor and shall be the subject to the same prior approval by the Engineer. The testing and commissioning procedure shall embody the following principles:
  - All plant shall be tested off site prior to delivery. No plant or equipment will be accepted and paid for if it is not accompanied by the manufacturer/supplier certificate verifying that it has been tested.
  - All plant and systems on site shall be tested as early as possible after installation to verify that the plant/system/subsystem is operating correctly.
  - No testing or commissioning shall take place without an approved written procedure.
  - The responsibility for the proper testing and commissioning of the system rests fully with the Contractor. This includes the provision of all necessary test equipment, measuring and test points, valves and dampers, etc. to test and commission the system.
  - At the time of submitting equipment for approval full details of the commissioning requirements shall be provided.

2 TESTING AND COMMISSIONING PROGRAM

- At least four weeks before commencing any testing and commissioning the contractor shall submit a complete program for such work so that the Engineer can arrange to be on site at the appropriate time. The programme shall embody the agreed testing and commissioning procedure.
- The programme shall include -
  - A bar chart covering all activities.
  - Names and addresses of companies involved in each activity.
  - The way in which each test will be carried out complete with pro forma forms for tabulating results.

3 EQUIPMENT AND PROCEDURE

- The equipment supplied under this Contract shall be subject to inspection by the Engineer or his Nominated Agent at all stages of manufacture.
- The tests and commissioning procedure as laid down and such additional tests as the Engineer may reasonably require to prove compliance with the Specification shall be carried out at the Contractor's Works and at Site.
- The Contractor shall give reasonable notice of time and place in writing to enable the Engineer to inspect and witness tests of materials and equipment. He shall provide the Engineer with facilities for witnessing the tests and for any additional tests or inspection of any portion of the works as required by the Engineer.
- The Contractor shall at his own cost render all assistance and supply all labour, appliances and any other materials, as the Engineer may require to check the setting out, measure up and inspect any portions of the works at any stage during fabrication, construction, erection or painting. During such operations, the Contractor shall if required, suspend any or all of the Works, with-out having claim for loss or damage as a result thereof.
- The testing of the plant (or any part thereof) supplied under this contract shall be carried out through its full operating range (or part thereof) as required by the Engineer.
- All such tests and inspections and the necessary inspection facilities shall be provided as part of the Tendered price for the Contract.

- At the commencement of and during the whole of the Commissioning and Testing Periods, the Contractor shall have available on site all essential spares and tools considered necessary to enable repair work of defective parts to be carried out immediately in the event of a breakdown or adjustments being necessary.
- The Contractor shall be responsible for the proper operation and maintenance of the plant throughout the period of the tests and until the operator training period is complete.
- Acceptance by the Engineer of any plant item, following such inspection or tests, shall not relieve the Contractor of any obligations under this Contract.
- All pumps shall be lined up and tested as a complete set. Test certificates shall be supplied before dispatch.
- All rotors and motor/impeller combinations shall be statically and dynamically balanced. Test certificates shall be supplied before dispatch.
- All such other tests as required by the Engineer to prove compliance with the specification, shall be carried out.

4 TEST CERTIFICATES

- The Contractor shall provide three copies of test certificates in respect of all materials and equipment, further copies are to be bound into the operating and maintenance manuals.

5 INSULATION TESTS

- All electrical wiring and equipment shall be subjected to insulation tests. All instruments and other equipment for the tests shall be provided by the Contractor.

6 DRAINING AND CLEANING

- On completion of the pressure test on a section of pipework, the water used for testing shall be drained away as quickly as possible to remove as much dirt and dross as possible. After completion of a pipework circuit the circuit shall be flushed through to remove all pipe scale, dross and similar materials.
- The Contractor shall provide all necessary connections, by-pass pipes, temporary strainers, and temporary make-up pieces, to enable the systems to be drained and cleaned.

7 PLANT COMMISSIONING

- The Contractor shall arrange at his cost for the manufacturer's representatives to check over and fully commission all major items of equipment. This work is to be carried out by skilled engineers preferably employed by the manufacturers, who are completely familiar with the equipment involved and shall be capable of training the operating and maintenance staff in the duties they are to perform.
- On completion of the plant commissioning, the Contractor shall obtain written confirmation from the various manufacturers that they have completed all commissioning work and are satisfied that the items of plant for which they are responsible are functioning satisfactorily.
- Copies of the manufacturers written confirmation shall be sent to the Engineer.

8 TESTS ON COMPLETION

- On completion of the balancing and commissioning of equipment the plant shall be put into normal operation and the final adjustments of the equipment shall be made.
- Thereafter the Tests on Completion shall be carried out to ensure that the plant meets the specification.
- Such tests shall include the following:
  - Simulated tests for all alarm and safety cut out equipment to prove the operation of the equipment.
  - Simulated tests on automatic controls to prove the ability of the controls to correct conditions which are outside the required design conditions. The tests shall be carried out by manually changing the desired values to produce an incorrect condition and then re-setting the controls to the design conditions and checking the operation of valves, etc. to restore the design conditions.
  - Operational tests on the Plant to demonstrate that it is giving the rated output and efficiency.

- The Contractor shall provide all necessary temporary measuring and recording equipment. The equipment shall be of a type generally used for this type of testing and shall be to the approval of the Engineer. All instruments shall be accurately calibrated before the tests begin.
- On completion of the whole of the tests and when the Contractor is satisfied that the entire plant is operating satisfactorily and will fulfill the function for which it has been supplied, he shall submit to the Engineer triplicate copies of all test records and charts together with reports on all the tests required in terms of the approved Quality Verification Plan. The Engineer shall reserve the right to ask for any reasonable additional tests or for the repetition of previous tests in order to prove that the operation of the plant is satisfactory and in accordance with the Performance Specification.

SECTION 2 PART 1.8

STANDARD SPECIFICATION FOR FIRE DAMPERS

1. General

- Fire dampers shall be to the latest SABS 193 - 1972 as amended.
- Fire dampers shall be fitted into walls, partitions and slabs to ensure a fire barrier around the damper.
- All fire dampers shall operate by means of fusible links as well as solenoids.
- Wiring to the solenoids will be by the successful tenderer.

SECTION 2 PART 1.9

STANDARD SPECIFICATION

FOR

GENERAL EQUIPMENT PROTECTION

1. PROTECTION AGAINST DAMAGE

- All equipment delivered to site shall be adequately protected against damage that can be expected on a building site.
- Protection against weather is the responsibility of the sub-contractor carrying out the work detailed in this specification.

2. GENERAL MACHINERY PROTECTION

- All high speed couplings, projecting shaft ends and every dangerous moving part of machinery which is within normal reach of a person shall be protected by a guard manufactured from not less than 1,6 mm mild steel plate.
- The coupling guards shall be neatly formed and securely fixed in position.
- All belt or rope drives with normal reach shall be adequately protected by a belt guard.
- The belt or rope guard shall be manufactured from wire mesh or open type expanded metal, securely braced and stiffened with light rolled steel section and bolted in position.
- All chain drives shall be fitted with sheet steel chain cases and lubrication facilities to chain manufacturers' recommendations. All joints shall be dust tight and arranged for convenient installation and dismantling.
- Each chain case shall be fitted with a hinged inspection door, drain hole and plug.
- All guards shall be finished in a light orange colour to B.5. 381. C.

SECTION 2 PART 1.10

STANDARD SPECIFICATION

FOR

THERMAL INSULATION

1. GENERAL

- All thermal insulation work shall be executed by a specialist in this specific field.
- The work shall be executed in a workmanlike manner and the final surface shall be of a neat, smooth and symmetrical finish.
- Thermal insulation of equipment shall comply with BS CP3005 - 1969, provisions of BS 1334, BS 1558 and BS 476 or the latest amendments as applicable.
- Oil, grease, rust, scale and dirt shall be removed from surfaces by means of a suitable cleaning agent before the application of insulation.
- No equipment shall be insulated until tested and approved.
- Adhesives. sealant and coatings shall be compatible with the insulation material,
- Certified test reports from an instance approved by the Engineer shall be submitted by the sub-contractor in which the following information is given:

    - The thermal conductivity of insulating materials at operating temperature.
    - The surface spread of flame or insulating materials, adhesives and other finishes.
    - The permeance of vapour barrier systems (cold water systems).
    - The sound absorption co-efficient of insulating materials (internally insulated ducts).

- Pipes shall be painted with bitumastic paint before application of insulation.
- Surface spread of flame of insulation cladding shall be in accordance with BS 476 Class I Specification,
- The permeability of insulation cladding around chilled water pipes shall not be more than 1.
- Thickness of insulation cladding will be checked by the Engineer after completion of insulation work, If any thicknesses are less than that recommended by the manufacturer, the sub-contractor will be requested to apply one extra coat over the whole installation at his own expense,
- Insulation, adhesives and finishes shall be resistant to rotting, mould, fungus growth, decay or attack by vermin.
- Continuity of the vapour barrier shall be ensured.

2 CHILLED WATER PIPES

- All supply and return pipes shall be insulated with preformed sections of insulation with a heat transmission co-efficient not higher than 0,035 watts per square metre degree C.
- The insulation thickness shall not be less than 25 mm. Insulation on pipes larger than 125 mm in dia. shall not be less than 40 mm.
- The preformed sections of insulation shall be provided with a factory applied canvas finish. During installation the sub-contractor shall ensure that the canvas finishes overlap each other by at least 25 mm on all joints.
- A vapour-proof protective cladding equivalent to "FOSTER SEALFAS coating 30-36" or "DECADEX FIRECHECK" shall be brush-applied over the canvas covering. The application shall be as follows:
- FOSTER 30-36 - 2 coats each at 1,6m per litre DECADEX FIRECHECK - 2 coats each at 1m2 per litre
- Circumferential joints to the insulation shall receive one application of "FOSTER FOAMSEAL 30-45" or equivalent, to the full thickness of the insulation during erection to obviate lateral migration of moisture vapour along the pipe when in service.

- All points where pipe supports are used or where the vapour barrier is broken due to cut-outs in the insulation, shall be sealed with "FOSTER FOAMSEAL 30-45" or equivalent during erection.
- Circumferential and longitudinal laps to the canvas shall be adhered with "F0STER SEALFAS coating 30-36'l or equivalent before application of final coats.
- Bends and fittings shall be insulated and covered as described for pipes.
- At no point shall the insulation be less than 25 mm thick over any pipe or fitting.

3 INTERNAL AIR DUCT INSULATION

- All air conditioning supply and return air ducts shall be internally insulated with 25 mm thick insulation to the latest edition of the relevant SABS Specification unless otherwise specified.
- Insulation material shall be resin bonded, mineral or glass fibre with a protective synthetic membrane specifically designed for internal duct insulation.
- All leading and trailing edges of insulation shall be fitted with metal nosing piece to keep the insulation in place. This nosing piece shall cover the insulation for a minimum distance of 30 mm over the entire perimeter.
- In addition to the welded pins, positioned as described in the latest edition of the relevant SABS Specification, the insulating material shall be glued to the sheetmetal ensuring a 100% area adhesion.
- The minimum insulation material density shall be 24 kg/m3.
- Any damage to the insulation or membrane shall be repaired to the satisfaction of the Engineer.

4 EXTERNAL DUCT INSULATION

- Air conditioning supply and return air ducts shall be externally insulated with insulation of at least 25 mm thickness where external insulation is specified.
- Insulation material shall be resin-bonded mineral or glass fibre with a protective aluminium facing specifically designed for external duct insulation.
- Insulation shall be installed in a neat and workmanlike manner.
- Insulation shall be adhered to the duct surface by means of "FOSTER SAFETEE DUCTFAS ADHESIVE 81-99" or equivalent.
- The sub-contractor shall ensure a 100% area-bonding between the duct and insulation.
- The insulation on the sides and bottom of the duct shall be pinned with mechanical fasteners as described for internally insulated ducts.
- All joints shall be taped with an aluminium adhesive tape approved by the Engineer.
- The continuity of the vapour barrier shall be insured.

5 METAL CLADDING OF PIPES

- All chilled and hot water pipes in plantrooms shall be provided with a 0,5 mm thick galvanised sheetmetal cladding over the insulation material. The cladding shall be installed after the vapour-proofing has been approved by the Engineer.
- Care shall be taken not to damage the vapour barrier.
- Cladding shall be secured by stainless steel bands every 500 mm. Self-tapping screws shall not be used.
- The sheetmetal covering shall be cut at pipe supports or hangers.
- No dents or any damage to sheetmetal covering will be accepted at the final inspection.

6 VALVES AND FITTINGS

- Valves and fittings shall be insulated with resin-bonded mineral, wool or glassfibre with a minimum density of 96 kg/m3.
- Plaster of at least 13 mm thick shall be applied over a steel mesh covering the insulation. The plaster shall be of the non-asbestos hard setting compound type, trowelled to a neat, smooth and symmetrical finish.
- The insulation of valves and fittings shall fit neatly to the rest of the pipe insulation.

- Care shall be taken that all valves and fittings can be operated without damaging the insulation.
- The end plates of strainers shall be insulated with suitable closed cell foam rubber to prevent any dripping.

7 HOT WATER PIPES

- Hot water pipes shall be insulated as described for chilled water pipes.

8 STEAM PIPES

- Steam pipes shall be insulated as for hot water pipes but with the following insulation thicknesses:
  - Pipes up to 40 mm dia. - 40 mm
  - Pipes bigger than 40 mm dia. - 50 mm
- Steam valves, flanges and fittings shall be insulated as for hot water valves and fittings but with the insulation thicknesses as specified above.
- Condensate pipes shall be insulated as specified for hot water
- Condensate valves, flanges and fittings shall be specified as for steam valves, flanges and fittings.

9 THERMAL STORAGE VESSELS AND HEAT EXCHANGERS

- Insulation shall consist of a 100 mm thick layer of resin-bonded mineral, wool or glassfibre with a density of 96 kg/m3.
- The insulation shall be covered with a 0,5 mm thick sheetmetal covering properly dished and strengthened to ensure a neat installation.
- All manholes and inspection welded seams shall be provided with easily removable sections.
- Where pipes are connected to the equipment a flange of sheet-metal shall be provided fitting neatly around the pipe and welded or screwed to the sheetmetal covering over the insulation.
- No dents or any damage to the sheetmetal covering will be accepted at the final inspection.

SECTION 2 PART 1.11

STANDARD SPECIFICATION

FOR

STEEL FABRICATION AND WELDING

1 STEEL FABRICATION AND BASEPLATES

- The manufacture of all fabricated items of plant shall be generally in accordance with BS 449 as amended, Part S.
- The fabrication and manufacture of the plant and equipment shall be completed in the Contractor's workshops before delivery to site.
- No fabrication of completed units shall take place on site, sitework shall be confined to only such minor alterations and adjustments as are found to be necessary during erection. If major alterations are found necessary, the items of plant concerned shall be returned to the Contractor's workshops for modifications or replacement and shall be tested and checked before re-delivery to site
- Drive baseplates shall be robustly constructed and adequately stiffened to prevent twisting and distortion. The ratio of the base length to its height shall not be more than 10:1.
- Fabricated baseplates shall be of all-welded construction and formed of rolled mild steel plates and sections.
- Surfaces shall be free from recesses and cavities wherever possible to prevent the accumulation of dirt and/or waste material,
- Where driving units are directly coupled to the driven component all mounting surfaces shall be accurately machined to ensure correct alignment. After final shop assembly and testing, the individual items of plant shall be accurately dowelled in position on the baseplate to prevent any misalignment during installation or ducting operation.

2 STRUCTURAL STEELWORK

- The structural steelwork used in this Contract shall be in accordance with BS 15.
- Black bolts and nuts shall be in accordance with BS 916. Black metal washers shall be in accordance with BS 3410, Part 2. High strength friction grips, bolts, nuts and washers shall be in accordance with BS 3139, Part 1, and their application shall con-form to BS 3294, Part 1, torque wrenches or impact tools where used shall be recalibrated before each shift- All fabrication and erection procedures shall be in accordance with BS 449 as amended, Part 5.
- Before commencing the fixing of the steelwork an erector shall check the seating for line. level and bolt setting and any errors which cannot be accommodated by the steelwork shall be reported to the Engineer

3 WELDING

- All oxy-acetylene welding and testing shall be in accordance with B.5. 1821 or BS 2640, as applicable, for oxy-acetylene welds in mild steel pipe lines up to 1670 kPa and/or temperatures up to 218°C.
- Metal arc welding shall be in accordance with B.5. 1856 or BS 2633, as applicable.
- Before any welding is undertaken, each welder to be used on the Contract Work shall make a sample weld in the Works or on Site of an average size pipe or section of the same physical and chemical analysis as that to be used for the Contract. These test welds shall be executed in the presence of a representative of the Engineers and when completed the welds shall, after stress relieving or normalizing, be cut up and specimens prepared for micro and macro examination and physical tests- After the welding samples have been approved only the welders who have been responsible for these samples shall be employed on the Contract Works.
- The Engineer shall reserve the right to ask for welded joints to be removed for detailed testing at the Contractor's expense.
- On completion each weld shall be coated with one coat of red lead paint.

SECTION 2: PART 2

DETAILED TECHNICAL SPECIFICATION FOR THE AIR-CONDITIONING AND VENTILATION INSTALLATION

DETAILED TECHNICAL SPECIFICATION

FOR THE

AIR CONDITIONING AND VENTILATION INSTALLATION

AT THE

RUNNYMEDE LIBRARY

2.1 GENERAL

This specification covers the design, (insofar as design is required for the correct selection of equipment), supply, delivery, installation, testing, commissioning, and maintenance during the twelve month guarantee period of the General Air Conditioning and Ventilation Installation (HVAC) at the RUNNYMEDE LIBRARY.

This is a fast tracked project and will require a contractor that has the “know how” and efficiency to execute the HVAC scope of works.

This document must be read in conjunction with the bill of quantities.

2.2 DESCRIPTION OF INSTALLATION

- This specification covers the Air Conditioning and Ventilation Installation for RUNNYMEDE Library.
- The contract includes the design (insofar as design is required for the correct selection of equipment), supply, delivery, installation, testing, commissioning, maintenance and guarantee of the installation as described herein.
- Tenderers are instructed to visit the site. No claim arising out of lack of knowledge of the site or environs will be considered.
- The work will be carried out in accordance with the programme set out by the client. The Air Conditioning contractor shall, by submitting a tender, accept that any penalties arising from the inability of the Air Conditioning Contractor to meet the project programme will be payable by the Air Conditioning contractor.

2.3 SCOPE OF WORK

This contract shall include but shall not be limited to:-

- The design (insofar as design is required for the correct selection of equipment), supply, delivery, installation, commissioning, maintenance and guarantee of the Air Conditioning and Ventilation System.
- The delivery of material and equipment must include packing, forwarding, payment of all freight, insurance, import, customs, excise and other duties, levies, railage and all other transportation and delivery charges.
- Management of manufacturing and delivery of all HVAC equipment.
- The preparation of all necessary workshop drawings, detail drawings, submission of samples and performance specifications as detailed herein. This will include taking whatever on site measurements is necessary for the preparations of the drawings and for the design work required.
- The co-ordination of Air Conditioning and Ventilation Installation with other trades.
- The timeous provision of all necessary builders work details to the Engineer showing all equipment bases, openings, etc.
- The provision of all wiring and control systems necessary to complete and make operational the Air Conditioning and Ventilation System described herein.
- The painting and finishing of all equipment, piping, ducting, etc. as described herein.
- Unless otherwise indicated, all grilles, louvres, diffusers, etc. shall be provided and installed as part of this contract.
- The Tenderer shall ensure that the equipment offered fits into the spaces provided with adequate access and maintenance space. If, in the opinion of the Engineer, the equipment does not fit into

the space provided with adequate access and maintenance space other equipment selected by the Engineer shall be provided at no additional cost.

- The tender price shall include an allowance for all tools, equipment, scaffolding, hoisting, transport, etc. necessary for the completion of the works.
- The supply and delivery of commissioning spares must be included.
- Interface with the Engineer during commissioning.
- The supervision of and responsibility for the commissioning including preliminary trials, final testing, starting, setting to work, proving and handing over to Client of all plant, equipment and materials in full working order under the stated operating conditions and complying with the performance and other guarantees specified.
- The supply of all specified operating, training and maintenance information including complete parts data, parts manuals (if applicable) and drawings as specified.
- The remedy of the plant and equipment during the "Defects Liability Period".
- The supply of all services, information and data.
- Any other items not covered by the foregoing, but forming part of the contractor's obligations and responsibilities.

Generally the contractor shall, as part of the contract, also allow for:

- All the foregoing shall be carried out by the Contractor in accordance with the Specification and the other contractual documentation to complete the Contract Works within the Contract Program and at the Contract Price stated in the Contract.
- The whole of the Contract Works shall be complete in every respect, ready for operation and continuous production at full load. Should any part or parts of the plant/ work/ services/ information which may be necessary for the satisfactory operation and maintenance of the plant/ equipment be omitted by the Contractor, such items shall be provided expeditiously by the contractor free of all extra cost to the Client.
- The subcontractor shall supply and install all equipment and materials necessary for the complete and correct electrical operation of the mechanical services under normal operation, fire mode and emergency power mode.
- The smoke detection contractor shall allow a fire signal, specifically a 2-pair cable for final connection by the mechanical contractor to the control terminals. Note that the fire signal shall be a fail-safe type consisting of a potential free normally closed circuit. Further note that the fire signals relay is only able to switch up to a maximum of 5 amps / 220 volt AC.
- All items of equipment shall be of good quality with regard to design and manufacture and shall be completely satisfactory for operation, control, safety and maintenance under all conditions of service.
- Uniformity of type and manufacture of switchgear, control gear, fittings and accessories shall be preserved throughout the whole of the installation.

2.4 WORK BY OTHERS

The tenderer shall however furnish full details in the tender data sheets of any further items of equipment, material and work not provided for in this tender.

Important Note
All items of plant, equipment and work not listed above and in the tender data sheets as being excluded, shall be deemed to be included in the tender and / or contract prices.

2.5 PROGRAMME

- The successful Air Conditioning and Ventilation Subcontractor will be required to commence work in accordance with the programme set out by the client.

2.6 SERVICE CONDITIONS

- All equipment offered shall be selected (and give specified capacities) and suitable for continuous operation at the following site conditions:

Ambient temperature	34.0C db 20.0C wb
Indoor Design conditions	22.5C db 55% RH

Winter Indoor	20.0C
Winter Outdoor	2.0 C
Altitude	2126m

2.7 STANDARDS AND REGULATIONS

The Installation shall be designed and installed in accordance with the following standards, Design Codes and regulations:

- National Building Regulations and Standards Act No 103 of 1977 as amended
- Occupational Health and Safety Act No 85 of 1993 as amended
- SANS 10400 – The Application of the National Building Regulations (All relevant parts applicable)
    - SANS 10400 Part A – Determine the occupancy density
    - SANS 10400 Part O – to Determine Fresh Air and Extract requirements
    - SANS 10400 Part XA – to determine energy requirements
- SANS 204 – Energy Efficiency in Buildings, 2011 as amended
- SANS 10147 – Refrigeration systems including plants associated with A/C systems
- SANS 1125 – Room Air conditioners and Heat Pumps
- Wiring of Premises SABS 0142-1987 as amended.
- Identification Colour Markings SABS 0140
- BS EN 121010 – Smoke and Heat Control Systems
- South African Green Building Guidelines.

2.8 HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS

The buildings will be air conditioned as per following:-

- The following areas will be airconditioned by independent inverter DX type split unit system with each system made-up of a condensing unit, indoor unit, insulated refrigerant piping, and a wall mounted simple controller per unit.

    - Computer room
    - Kids room
    - Librarian office
    - Study room
    - Open office space/boardroom

- Forced fresh air will be provided to the units by means of an axial fresh air fan as indicated, drawing air from outdoors through a filtered plenum via ducting to each AC indoor unit. The individual ducts feeding the indoor units will come complete with balancing dampers to ensure the system can be balanced during commissioning stages. The fan shall be complete with a speed controller.

- The Library hall will be airconditioned by a Rooftop Packaged Unit positioned on the ground floor slab as shown on the drawing. The system will be controlled via the sensors positioned in the library hall.

- List of approved manufacturers for fans:
    - Expelair
    - Vortice
    - AMS
    - Or approved equivalent

2.9 PACKAGED AIR CONDITIONING UNITS - AIR COOLED

The packaged air conditioning units shall be suitable in all respects for outdoor location.

Units shall comprise of the following components all housed within or forming part of, their cabinet:

Refrigeration Compressors

Air Cooled Condensing Coils
Condenser Fans and Motors
Refrigeration pipe work and controls
Refrigerant gas charge
Direct Expansion Cooling coils
Centrifugal Supply Air Fans with Motor and Belt Drive
Cleanable air filters
Mixing plenum with Economy Cycle Dampers
Electric Switch panel
Internal electrical wiring.

Unit casings shall be constructed of not less than 1,2mm thick steel panels suitably braced and framed so as to prevent drumming whilst at the same time being arranged in easily removable panels to facilitate access to any portion of the internal components. Casing panels shall be attached to a sub-frame of welded mild steel sections, which framework shall also hold all internal equipment in position. The casing panels shall be internally lined with "sonic liner" or equivalent non-combustible material, such insulation being adequately secured to the internal surfaces with non-combustible adhesive and mechanical fasteners. All mild steel casing panels and framework shall be thoroughly degreased and then painted with a suitable rust proofing primer prior to the application of two finishing coats of good quality enamel or lacquer in the standard colour of the manufacturer.

Tenderers are to note that the unit casing specification above is the minimum required and that preference will be given to units having double skin panel construction. Further, preference will be given to units having an outer skin of anodised aluminium or be of a fibreglass construction.

Units shall contain a minimum of two refrigeration compressors. These shall be of the hermetic or the accessible hermetic type direct driven by integral suction gas cooled squirrel cage motors at a rotational sped not exceeding 1500 r.p.m. The compressor shall be complete with positive displacement reversible force-feed lubrication systems, have low oil pressure protection and contain crankcase oil heaters to ensure boil-off of dissolved refrigerant from lubricating oil when the compressors are stationary.

Each compressor shall have at least one stage of capacity modulation other than full load and shall be arranged to start unloaded.

Condenser coils shall consist of copper tubes with mechanically bonded aluminium plate fins, all housed in a robust galvanised steel frame and protected with a suitable galvanised wire mesh screen. Suitable space shall be provided at the coil ends in order that tube bends is easily accessible in the event of possible refrigerant leaks.

Condenser fans shall be of the slow-running propeller type direct driven by squirrel cage electric motors. The units shall be provided with a minimum of two propeller fans, which shall be arranged for preferable vertical discharge through suitable weatherproofed protective wire guards. The fan and motor shall be resiliently mounted so as not to transmit vibrations to the unit casing.

Condenser air intake and discharge arrangements shall be such that no short-circuited discharge air can be drawn back into air intake.

Refrigerant pipe work shall be carried out in seamless refrigerant quality copper tubing, suitable provision being made that the piping is not subjected to any stresses by vibration from the compressors. The refrigerant system shall be split into at least two stages on the liquid side for adequate capacity control. Refrigerant circuit shall incorporate replaceable type filter-dryers, sight glasses, thermostatic expansion valves and vapour proof insulation on the suction lines. The systems shall be factory charged with Refrigerant R407C.

Automatic safety controls within the unit shall include a dual pressure switch with manual reset on the high-pressure side and an oil pressure switch manual reset. Provision shall be made for pressure relief of the high side refrigerant piping in accordance with government regulations. Provision shall also be made for cycling the condenser fans so those units may be capable of operating down to an ambient temperature of 10°C db.

Direct expansion cooling coils shall consist of at least two separate refrigerant circuits and shall comprise of copper tubes with mechanically bonded aluminium fins. The coils shall be encased in a

heavy gauge galvanized steel casing and fitted with a 1,2 mm thick stainless steel condensate pan so sizes and located to prevent entrapment of moisture into the air stream, whilst also ensuring positive drainage of condensate.

Supply air fans shall be of double inlet forward curved centrifugal type with impellers running in sealed, permanently lubricated ball-bearing plumber blocks located in the suction eye on each side of each fan. Fan impellers shall be statically and dynamically balanced and run well below critical speed. Fan assemblies shall be so mounted within the packaged air conditioning unit that they do not transmit any vibration. Where units having more than one fan are offered, these shall all be driven by a common motor.

Tenderers are to note that the supply air fan specification above is the minimum required and that preference will be given to units having a single backward curved centrifugal fan mounted on anti-vibration mounts and complete with a ventilated removable guard on the V belt drive.

Supply air fan motors shall be three phase squirrel cage type rated not less than 25% above the power input absorbed by the fans and run at a rotational speed not exceeding 1500 r.p.m. The motor shall drive the fans by means of a V belt drive having not less than two V belts.

Air filters shall be equal to **FIBATRON WP77** minimum 50mm thick high performance washable pleated panel type housed in adequate holding frames and fitted with gaskets to ensure a positive airtight seal around them.

The return air and fresh air mixing plenum shall be factory installed and shall be of similar construction to the rest of the cabinet. The mixing plenum shall be complete with return air and maximum fresh air volume control dampers equal to those specified later herein.

Because of the use of an economy cycle and the resultant possible low on coil dry bulb temperature in the intermediate season the compressors shall be protected by low limit thermostats positioned in the mixing plenum and set to prevent the compressors from operating at a mixed temperature below 18°C.

A weatherproof electrical switch panel shall be incorporated to from part of the unit and shall house all the necessary switchgear and controls required to operate the various components within the units. The switch panel shall comply with best modern practice and incorporate all necessary protection against overload or short-circuit. The switch panel shall be fitted with a suitably sized main isolator backed up by High Rupturing Capacity fuses with a minimum capacity to suite the system fault level. In addition phase failure relays shall be incorporated to protect against low voltage or phase failure. The switchgear shall be fully interlocked so that cooling and heating cannot operate simultaneously and so that the compressors cannot operate unless the condenser fans and supply air fans are operational. A run down timer shall be incorporated so that the supply air fans shall continue to run for three minutes after the unit is switched off. The switch panels shall be fully labelled with engraved black ivorine labels having 6mm high white lettering. The labels shall be riveted chassis plates to identify all switch-gear, relays, instruments and controls inside the switch panel.

Wiring within the switch panel and the unit shall comply with wiring regulations as relevant and shall be colour-coded in the colours red, yellow and blue for the relevant phases and black for neutral, the bus bars being similarly marked. Bus bars shall be copper of adequate cross sectional area, suitably spaced and mounted on stand off type porcelain in insulators. All exposed current carrying parts must be fully insulated in P.V.C. tape of the colours mentioned above. Every wire inside and outside the switch panel shall be fitted with ferrules and labelled with identical numbers at both ends. All outgoing leads shall be connected to a clearly marked terminal strip.

Supply, deliver, install, commission, test and hand over a variable refrigerant flow (VRF) air conditioning plants or other approved type. The plants shall utilize a three-pipe system.

2.10 DX INVERTER TYPE SPLIT AIRCONDITIONING UNITS

(This section is to be read in conjunction with the General Technical Specification for DX self-contained type units – Section 3 Part 1.4)

All DX type split air conditioning units are to be equipped with inverter type compressors.

The AC system is provided by way of split units in the server and data rooms in all office blocks. The split unit's indoor fittings are mid-wall units.

Mid-wall units are to be mounted on the wall, at the centre of the mounted wall from a horizontal perspective and at a high enough level such that it does not clash with windows. .

Piping between the indoor unit and outdoor condenser shall be with SABS 460, class 2 copper pipe. The pipe shall fit together by capillary fittings and shall be further insulated.

The mid-wall split units should be mounted back-to-back as much as possible. In the event that this is not possible, the piping must be placed on cable trays and these trays should be mounted to the soffit or roof truss, with treaded bar and nut/bolt combination. The piping running in service ducts should be placed in PVC trunking. Refrigerant piping running outside the building (external wall or on roof slab) should be in sheet metal trunking. All trunking shall have removable covers and be accessible.

All piping shall be visually inspected for quality before a hydrostatic pressure test is conducted on the piping. This must be witnessed by the engineer or site representative.

Condensate drains from the mid-wall units must be piped to the nearest drain and allowing for a fall of 1:100. The HVAC contractor shall be responsible for the u-trap before the drain connection. Drain piping shall be uPVC conduit type and surface mounted. Exposed piping shall be placed within trunking as stated above. The trunking must be painted to suit wall colour and must be approved by architect.

The control for mid-walls shall be done by wired remote control. Care must be taken when running the control wire and conduits should be shared if possible. Chasing of conduits must be confirmed with structural engineer before breaking.

Outdoor units must be mounted on anti-vibration mounts.

Units must be stored safely before installation and covered if building work is continuing in an area.

Openings through the wall for piping must be closed and made good after installation by the HVAC contractor.

The unit shall be a factory assembled unit housed in a sturdy weatherproof casing constructed from rust-proofed mild steel panels coated with a baked enamel finish.

The compressor shall be equipped with inverter controller capable of changing the rotating speed to follow variations in cooling and heating load.

The noise level of the outdoor unit shall not be more than 58 dB(A) at normal operation measured horizontally 1m away and 1.5m above ground.

The contractor shall further install a 20 x 15 mm industrial wire mesh screen over the condenser coils to protect the coils from hail damage.

The condensing units shall be connected with refrigerant pipes to their respective indoor units as indicated on the drawings. The pipe work design shall comply with the manufacturer's specification in terms of piping sizes, design philosophy and distribution for proper refrigerant flow, so as not to compromise the capacity or functioning of the indoor unit.

Unless refrigeration pipe work is provided with the equipment purchased, all exposed to view field refrigeration piping not laid in wire trays shall be of hard drawn Maksal, type RL, copper piping, suitable for refrigeration purposes using the selected refrigerant. Covered and hidden piping may be soft drawn Maksal, type RL, copper piping, suitable for refrigeration purposes.

All joints shall be soldered using silver solder containing at least 40% silver for copper to brass or other non-copper material and 10% min. silver for copper to copper joints. Connections to the condensing and evaporator equipment items shall be silver soldered.

Extreme care shall be taken during installation to keep the entire system clean and free of moisture.

All tubing shall be kept sealed, except during construction/ installation. Refrigerant lines shall be run neatly and horizontal runs shall be installed to a fall of 1:200 towards the compressors.

All refrigerant lines shall be neatly and adequately secured. Elbows, change in direction and welded joints shall be restricted to a minimum.

The refrigerant circuits shall have flexible vibration eliminators on all suction and liquid lines if these lines are ø15 mm or larger, unless the unit comes complete with these eliminators and/or the refrigeration connections are already isolated within the unit.

All refrigerant pipes to be covered with a galvanised trunking to prevent the insulation from UV rays. The trunking shall be painted as specified below.

The complete installation shall be in accordance with the manufacturer's recommendations and instructions. The refrigerant piping shall be insulated, sized and fitted with the necessary oil traps, all strictly in accordance with the manufacturer's requirements.

Compressors

Compressors shall be of the hermetic scroll type equipped with inverter control capable of changing the speed in accordance to the cooling or heating load requirements.

(a) The inverter shall be of the IGBT (Insulated Gate Bipoler Transistor) type.

(b) The outdoor units shall have at least 20 steps of capacity control to meet load fluctuation and ensure individual control for the indoor units.

(c) The compressors shall be equipped with crankcase heaters.

(d) Should the unit be equipped with more than one compressor then only one of the compressors shall be fitted with an inverter motor.

Heat Exchanger

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminium fins to form a cross fin coil.

The aluminium fins shall be covered by anti-corrosion acrylic resin film.

Refrigerant Circuit

The refrigerant circuit shall include an accumulator, E-bridge heat exchanger to control the liquid level in the receiver, liquid and gas shut-off valves, solenoid valves, filter drier and oil separator. The refrigerant shall be R410a or better ozone friendly refrigerant.

All necessary safety devices shall be provided to ensure the safety operation of the system.

Safety Devices

The following safety devices shall be part of the outdoor unit:

High pressure switch, fuse, crankcase heater, fusible plug, over current protection for the inverter, thermal overload protection on the compressors and condensing fans, a timer to prevent short-circuiting of the compressor and anti-freeze-up protection.

o protect the PCB's in the three phase outdoor units in an accidental event of voltage fluctuations, an auxiliary component will be installed externally to each outdoor unit. The circuit comprises a four pole contactor and a voltage monitoring device installed externally to the units next to the isolators, in a weather proof housing. Certain parameters will be measured. The primary component needing to be addressed is the supply voltage. This will be measured between phases, as this is the reference point for the adjustment of the potentiometers on the voltage monitoring device.

A maximum voltage of 430 Volts and a minimum voltage of 350volts will be allowed.

The over/under voltage monitor will interrupt the neutral feed to the four pole contactor coil, thus causing an immediate de-energising of the electro-magnetic field and spring tension will open the contactor. There is a one to four second monitoring period before the interrupter circuit actions itself.

Oil Recovery System

The unit shall be equipped with an oil recovery system to ensure stable operation and maximum oil separation.

Oil equalizing piping shall be installed between the condensing units to equalize oil levels every six (6) minutes and so ensure equal refrigerant distribution.

Installation

The position of the condensing unit is as shown on the drawings. If the moving parts of the unit are free of vibration, the units may be placed directly onto the concrete plinths on “Teco” rubber pads. If however, vibration is transmitted, the units will have to be installed on anti-vibration mountings.

Capacity

The cooling capacity of each outdoor unit shall meet the sum of the total cooling capacities of the indoor units of a single zone or the nominal capacity stipulated below, whichever is the highest. The outdoor units shall be selected at an utilization level of not more than 100%.

Indoor Units - Mid-Walls:

Indoor units shall be mid wall type, cassette and ducted hide-aways installed in the positions shown on the drawings.

Each unit shall have an electronic expansion device, which controls refrigerant flow rate in response to load variations of the room.

The address of the indoor unit shall be set automatically in case of individual and group control.

The mid-wall units shall consist of an evaporator coil, mildew-proof polystyrene condensate drip compartments, supply air fan, fan scroll, fan motor, controls, condensate pump and efficient filter all mounted in an attractive compact casing.

The unit shall be fitted with a single, silent running, diffuser type turbo fan. The fan blades shall be of dynamically balanced aluminium or other non-ferrous metal manufacture, mounted on a central shaft and driven by a continuously rated two-speed electric motor, resiliently mounted on a suitable cradle. The fan motor is to be fitted with self-aligning sealed bearings.

The fan motor shall be of the single phase, permanent split capacitor type with built-in re-settable overload protection. The motor shall have multi speed windings and shall be factory connected to a terminal box. All wiring is to be marked to correspond with labelled terminals matching the motor wiring diagram.

The supply air louvres shall be of the auto-swing type with remote pre-set and automated vertical airflow direction control.

The evaporator coil shall consist of a multi-pass coil of heavy gauge, solid drawn copper tubing mechanically expanded into aluminium cooling fins. The coil shall be provided with an automatic defrost thermostat to prevent excessive frosting.

The evaporator coil shall be completely sealed off to ensure that maximum supply air flows over the coil.

The air filter shall be of the easily accessible and removable mould resistant resin net type, washable with mild detergent. The filter media shall be arranged so that no air bypasses the filter at the edges.

The unit shall be efficient and extremely quiet in operation and the noise level shall not exceed 33 dB's on the "A" scale at a distance of three meters from the unit.

The units shall be self contained and set to deliver air that is filtered and cooled, or filtered and heated as may be required. The units shall be suitable for a single phase, 220V, 50 Hz, AC power supply.

Heating shall be by reverse (heat recovery/pump) cycle only.

Piping Installation

All refrigerant piping shall be supported from cable tray as indicated on drawings.

The cable tray installation will consist of 300mm wide cable tray down in riser duct from roof level to respective floors. This will accommodate the refrigerant piping and air conditioning electrical power supply & control cables.

Main 300mm wide cable trays shall be installed in the main passages of respective floors to accommodate refrigerant piping, supply and control cabling as indicated on drawings.

Refrigerant piping to individual indoor units shall be supported on 150mm wide cable tray as indicated on drawings.

All cable trays shall be supported from soffit above with threaded rods. Support intervals shall not be greater than 1.5 m. All threaded shall be trimmed to not extend 20mm past installation nut.

All cable trays and metal pipe supports shall be thermally insulated by means of thermal breaks from the refrigerant piping to prevent heat loss or gain and to prevent condensation of moisture on the pipe supports.

The pipe routes shown on the drawings are generally diagrammatic. The runs and arrangements of piping shall be as indicated, subject to modifications as required to suit conditions at the building, to avoid interference with work of other services and for proper convenient and accessible location of all parts of the piping system. All required offsets, fittings, valves, traps, drains, etc. may not be indicated but allowance must be made in tenders for all such necessary items to be furnished.

Piping shall be installed as straight and direct as possible, neatly spaced and in general forming right angles with, or parallel to walls or other piping.

The pipe sizes shall be installed by the contractor for the sizes of units offered in accordance with the manufacturer’s specifications and the schematic pipe layout indicated on the drawing. The pipe sizing must be verified by the manufacturer. Any discrepancy between this specification and the manufacturer’s specification is to be brought under the attention of the Engineer.

The piping network shall be connected using refrigerant branch joints, complete with the necessary reducers with the matching insulation as supplied by the system manufacturer.

Suction, discharge and liquid pipes are to be insulated separately and not grouped together as for a single line. Approved pipe insulation shall be used.

All piping shall be run so to avoid passing through ductwork, recessed light fixtures or interference with electric light outlets.

Where piping protrudes through building structures, pipe sleeves are to be installed, as part of the contract, to ensure easy removal thereof. No pipes may be built or plastered directly into the structure.

The main contractor shall be responsible for the drilling of the holes and making good on the outside of the building to the plaster and paint.

Pipe sleeves must be of similar material as the pipe and must be large enough to allow enough free space for movement.

Where specified and where the opening between the sleeve and pipe is large and unsightly, blank cover plates must be installed.

Sleeves through outside walls, slabs and piping through roofs and windows must be sealed off watertight.

All sleeves must be installed neatly and made watertight. The opening between the pipe and sleeve must be sealed off by means of silicon rubber or any other approved product.

Drain Piping

Provision shall be made for the drainage of condensate to the outside or to dedicated drain points by means of PVC piping of the sizes as indicated on the drawing.

Piping shall run above ceilings and vertical down in the positions indicated on the drawings. All piping shall terminate at ground level where it shall be routed to the nearest drain point.

Drain piping shall be installed without any loops in the piping where condensate can accumulate. The pipes shall have a uniform slope of 1 in a 100 from the unit to the outside and shall be tested in the presence of the Engineer.

The drain lines from individual indoor air-conditioning units shall have a minimum internal diameter of 25 mm.

Condensate pumps shall only be provided where it is specifically shown on the drawings, or where it is factory installed as an integral component of the air-conditioner. The condensate pumps shall be insulated as per the refrigerant lines.

External condensate drain lines shall be in Class 0 or better copper piping. Elbows and fittings shall be of the compression or capillary type. Bending of Class 0 copper piping will not be allowed. Internal condensate drain lines shall be in u-PVC.

Refrigerant Piping

All piping and fittings shall be of the best quality seamless, dehydrated, de-oxidised refrigeration class copper tubing, suitably sized for the unit installed and in accordance with SANS 460 as amended.

All refrigerant piping shall be hard drawn refrigeration copper tubing in accordance with ASTM B280-88.

Only jointing by means of capillary fittings will be allowed except in cases where equipment needs to be removed from the piping system for regular maintenance or replacement. In such cases joints between the equipment and piping shall be with DZR brass compression fittings.

Capillary type fittings shall comply with SANS 1067 - Part 2 or any of the related ISO 2016, DIN 2856 and BSS 864 - Part 2 specifications.

Soldering flux shall be used to remove residual traces of oxides, to promote wetting and to protect the surface to be soldered from oxidation during heating.

The flux shall be applied to clean surfaces and only enough should be used to lightly coat the areas to be joined and should be applied as soon as possible after cleaning.

Only the following solders shall be allowed to be used on capillary joints:

Composition	Specification
97/3 (97% tin and 3% copper)	SANS 24 – DIN 1707
96/4 (96% tin and 4% silver)	SANS 24 – DIN 1707
75/25 (75% tin and 25% zinc)	

Resin core and acid core solder shall not be used at all.
No welding of refrigeration systems will be allowed unless the pipe system is continuously filled and under pressure using nitrous gas.

All soldered joints, on factory supplied equipment, shall be carefully checked before commissioning

and remade if found damaged in transit.

Refrigerant piping shall be arranged so that normal inspection and servicing of the compressor and other equipment is not hindered. Locations where copper tubing will be exposed to mechanical damage shall be avoided.

A refrigerant charging connection shall be provided in the liquid line. Before charging the system with refrigerant the circuit shall be leak tested and dehydrated.

All pipes, vessels, etc. operating below ambient dew point shall be insulated and a vapour barrier provided.

An isolating valve shall be installed in both the liquid and gas lines where connected to the evaporator unit. Valves shall be of the bronze body, ball type.

When completed, the installation shall maintain a complete vapour barrier and any signs of sweating or dripping shall cause the installation to be rejected.

All piping shall be rigidly supported, both vertically and horizontally.

Inside the building piping shall be installed on approved medium-duty galvanised cable tray wide enough to accommodate both refrigerant pipes and the drain piping.

Outside the building piping shall be installed on approved medium-duty galvanised cable tray wide enough to accommodate both refrigerant pipes and the drain piping, including galvanised sheet metal covers painted to colour match the walls. Rung spacing shall be at 300mm intervals.

All cable trays shall be supported on approved 41x41x1.5mm galvanised channels including galvanised hold down saddles, bolts, nuts, washers and screws. The channel shall be supported from 8mm diameter hanger rods including washers and nuts. Channels to be spaced at intervals not exceeding 1500mm. Cable trays are to be installed to a fall of 1 in 100.

All cable ladders shall be supported on approved 41x41x2.5mm galvanised channels including galvanised hold down cup, bolts, nuts, washers and screws. The channel shall be rawl bolted directly to external walls or slabs. Channels to be spaced at intervals not exceeding 1500mm. Cable ladders to be installed to a fall of 1 in 100.

All piping shall be secured to cable trays and ladders with approved adjustable type galvanised cross rung clamps only. Care shall be taken not to pinch, compress or damage the pipe insulation when securing piping to cable trays and ladders. Any damaged insulation shall be completely removed and replaced to the satisfaction of the Engineer.

Strappings and cable ties will not be permitted. Hangers and supports where piping penetrates through walls shall be designed to prevent transmission of vibration to the building. Supports must be installed near to joints and fittings. Pipe clamps shall be installed at the following centre to centre distances.

Nominal Pipe Size	**Centre to Centre Spacing**	
Copper	**Horizontal Pipe**	**Vertical Pipe**
12 mm	1.0 m	1.2 m
15 mm	1.2 m	1.5 m
22 mm	1.5 m	1.8 m
28 mm	1.9 m	2.1 m
35 mm	2.1 m	2.4 m
42 mm	2.4 m	2.7 m
54 mm	2.4 m	3.0 m

66 mm	2.4 m	3.0 m
76 mm	2.5 m	3.0 m

Extra support must be supplied at T-offs, valves and other heavy fittings.

Pipe Insulation (Sans 1445 & Sans 1508 As Applicable)

The copper piping installed inside the building shall all be insulated with approved insulation. Vapour barrier integrity will be critical to prevent dripping. No zip type insulation will be allowed. Liquid and gas lines shall be insulated separately.
The insulation material shall meet the following minimum requirements:

Temperature range	:	-80°C + 120°C
Thermal conductivity	:	0,038 W/m K at 0°C
Thickness	:	15 mm
Density	:	35kg/m3
Odour Properties	:	Neutral
Cellular Structure	:	Totally closed
Fire Properties	:	Self-extinguishing

The insulation shall be applied to form a continuous and homogenous vapour barrier over bends, supports, etc. All joints and seams shall be glued. Non-drip tape shall not be used for assembling seams and joints.

All fittings and valves shall be wrapped with black non-drip tape.

When completed, the installation shall ensure a complete vapour barrier and any signs of sweating or dripping shall cause the installation to be rejected.

Insulated pipe work penetrating through masonry or concrete elements shall have its insulation extended right through the penetration to ensure the vapour proof integrity of the insulation. All penetrations shall be sealed and caulked to approval by the Subcontractor.

Pressure Testing On Piping

All new copper refrigerant piping shall be hydraulically pressure tested to 1.5 times the working pressure or 1000 kPa, whichever is the largest. The test shall be carried out in the presence of the Engineer.

All piping shall be subjected to the test pressure for a period of one (1) hour during which time the system shall retain the pressure with no leaks or losses.

Controls Individual control unit

All controls for the automatic control of the Air-Conditioning Services shall be of the electronic type. The control system shall be an integrated component of the air-conditioning equipment and shall be installed and maintained as part of this contract.

All sensors and controllers etc. shall be types suitable for maintaining conditions within the limits as elsewhere specified. The whole of the installation shall automatically restart on restoration of power after a power failure.

All controller positions shall be confirmed with the architect prior to installation.

All space thermostats shall be suitable for wall mounting.

Remote control panels shall be fully labelled.

The contractor shall supply and install approved hard- wired remote controllers in the positions indicated on the drawings.

The controller shall perform the following functions:

(a) Start/Stop.
(b) Temperature setting.
(c) Airflow setting.

2.11 VENTILATION/EXTRACTION SYSTEMS

Forced Mechanical Ventilation is being supplied to the building by way of a ducted fresh air system in line with SANS 10400 O requirements.

All active ventilation shall switch off in fire conditions.

2.11.1 Ventilation/Extraction Fans

Only good quality fans, from recognised manufacturers and suppliers with established local representation, and of the types as specified hereafter, shall be acceptable.

Alternative types of fans, suitable for the application and with noise level within limits and dimensions to suit the allocated equipment spaces, may be offered to provide the most economical solution.

The fans offered shall nevertheless meet the specified air flow rates at the indicated system resistance. Fan efficiencies shall under no circumstances be less than 60 %.

Filtered fresh air supply systems with air flows in excess of 150 L/s shall be complete with washable primary air filters equivalent to Peter McLeod Macs Pleat WP6 600.

Filter medium (25 mm thick) type filters, complete with galvanised sheet metal holding frame and wire mesh support may be provided in filtered fresh air supply systems with air flows lower than 150 L/s.

In systems where filters are provided, the face velocity over the filters shall not exceed 2.5 m/s and the fan duties shall be met with filters at 70% of their final resistance. It is also to be noted that pressure/flow characteristics of fans shall be reasonably steep in their operating range.

Tenderers are to note that the fan total/static pressures indicated in the schedules below are to be used as a guideline at tender stage only.

The required pressures are to be re-calculated by the Subcontractor to allow for the equipment, as well as any modifications to the duct sizes and routes, etc., offered by the Subcontractor. If the Subcontractor is unable to calculate the new system resistance, the Engineer will do so, and provided all the required information is made available by the Subcontractor. It shall nevertheless be the subcontractor’s responsibility to ensure that the system resistance of the new/altered duct layout is calculated and allowed for.

Prior to placing orders, the Subcontractor shall submit fan ordering advice schedules to the Engineer for approval. These schedules shall be in an approved format, showing the specified parameters as well as the parameters of the equipment that the Subcontractor intends to order. Performance curve graphs, showing the operating points of the selected fans shall accompany the ordering advice schedules.

Equal function fans shall be of the same type. Similar type fans shall be of the same make. Casings, cowls, etc. shall be in galvanised sheet metal of suitable thicknesses (industrial application).

Fans with motors larger than 1 kW shall be internally sprung within their casings, or shall be fitted with anti-vibration mountings. Axial fan motors shall be sized for fan blade angles 3˚ greater than that required at the specified fan duty point.

The fans and their associated equipment offered shall meet the sound levels specified herein. Tenderers or their suppliers shall calculate the noise levels generated by the offered fans, prior to

close of tenders, and, if necessary, provide proprietary made attenuators down- and/or upstream of the fans, whether shown on the drawings or not.

The sound attenuator selection procedure followed shall be similar to the method described in the "Woods Design for Sound" publication, published by Woods Fans Limited of Colchester England. The successful tenderer shall submit the design data and sound calculation sheets to the engineer for approval before ordering any fans and sound attenuators.

Others shall provide maintenance isolators 1 m from the relevant fans. Tenderers shall allow for wiring the fans from these maintenance isolators.

2.11.2 Axial Flow Fans

Axial flow fans shall be of aerofoil type equal to DONKIN, WOODS, LUFT or ZIEHL manufacture. They shall be of the size and type as indicated on the Drawings, and shall be capable of the duties specified in Part Four hereof.

Fan impellers and hubs shall be of die-cast aluminium alloy and shall be accurately balanced to ensure vibration less running.

The fan casing shall be fabricated from heavy mild steel plate suitably reinforced and fitted at each end with a flange drilled for fixing. An inspection door of ample size shall be provided in the casing.

The fan motor with frame diameter matching the impeller hub size shall form an integral part of the fan. The motor shall be of the totally enclosed, squirrel cage type suitable for the supply voltage specified. Motor connections shall be brought out to terminals located in a weatherproof external terminal box which shall be an integral part of the fan casing.

Fans shall be resiliently mounted on, or suspended from strong angle iron brackets by means of suitable anti-vibration mountings.

Fan speed shall not exceed the maximum values specified in Part Four hereof.

All ferrous parts of fan components shall be corrosion free.

2.12 SOUND ATTENUATORS

Sound attenuators shall be provided and installed in the positions indicated on the Drawings and shall be selected to provide the Noise Criteria levels specified in Part 4 hereof. Sound attenuators shall be of factory fabricated type equal to those manufactured by SOUND ATTENUATORS LIMITED or DONKIN.

The sound absorbing lining material shall impart no odour to the air, shall not delaminated readily, shall have no loose material or any exposed surface that may be detached by the air stream either during installation or under regular operating conditions. The material shall also be non-combustible.

All lining material shall be in good condition at the time of final inspection. Material that has been damaged in shipment by rough handling vibration or exposure shall be rejected. Material that has been damaged prior to final inspection shall be replaced or coated to prevent detachment of loose material as directed by the Engineer.

Sound absorbing lining material generally shall have a density of not less than 16 kg per m3, a thickness of not less than 25mm and sound absorbing efficiency at each frequency of not less than the following: -

Frequency cycles per second	250	500	1000	2000
Percent absorption	45	65	70	80

The factory fabricated sound attenuators shall be complete units consisting of an outer casing, sound absorbing material and internal baffles and supports. Casings shall be made of zinc-coated steel, not lighter than that specified herein for ducts of the same outside dimensions.

2.13 AIR FILTERS

Air filters shall be installed before the coils in the packaged air conditioning units and the air- handling units and shall be equal to FIBATRON WP 77 minimum 50mm thick high performance washable pleated panel filters.

Long life air filters installed in independent air filter banks in Plant Rooms or before the coils in packaged air conditioning units and air handling units, where indicated on the Drawings, shall be equal to BRANDT EXPO 3000 extended surface air filters with VILEDON type PSB 290 filter media having an arrestance of 90% (ASHRAE). Each filter cell shall be suitable for the manufacturer's recommended air flow of O, 833 m3/s at an initial resistance of 20 Pa. Manometers to be used in conjunction with these filters shall be set for a final resistance of 150 Pa.

Fresh air filters shall be of the same make, type and size as the return air filters fitted in the units and shall be fitted into the holding frames installed on the rear of the outside air intake weather louvre so as to be easily removable from inside the plant room area.

Air filters shall be fitted into holding frames, which shall be designed to allow negligible quantity of air to bypass the filters.

All filter banks shall be mounted in easily accessible positions and shall be reachable with a normal 1.8m long ladder.

2.14 DAMPERS

Dampers shall be provided where shown on the Drawings for shut-off, bypass or volume control purposes or where required to comply with local fire codes.

Volume control dampers shall consist of multiple blades acting in opposed blade manner, the blades being robustly linked together to operate in complete unison. Individual blades shall be hooked-edge construction, so bent for rigidity. The blades shall have steel trunnions mounted in bronze sleeve bearings or ball bearings. Permanently set dampers shall be provided with suitable devices to facilitate locking them in position with "Open" and "Shut" position indication.

Motorised dampers shall include suitable fastenings and supports for motor actuators.

Damper hardware shall be the product of an accredited manufacturer of such items, equal to DURO-DYNE. Dampers sections shall be housed in flanges steel metal casings of 1,6mm thick galvanised steel. Damper blades shall not exceed 200 mm in width and 1000 mm in length. Dampers over 1000 mm in length shall be sectionalised into separate cells each with its own shaft and bearings to ensure that the blade length of each section does not exceed 1000 mm.

Fire dampers shall be equal to BLENDAIR or TROX and manufactures to a recognised fire code with a two-hour fire rating. Damper casings shall have flanged ends and damper blades shall not exceed 300 mm in width. The fire dampers shall comply in all respects with the requirements of the local municipal fire authorities in the area where they are to be installed.

Damper blades shall be closed by the operation of approved fusible links located where they would be immediately affected by an abnormal rise in temperature of the air stream. When called for on the Drawings the blades shall also be actuated by solenoid operators, which shall be provided by the damper manufacturer. When closed in the blades shall be held by a catch arrangement so as to provide a positive seal against the air stream.

Duct mounted air volume control dampers and fire dampers installed in ducts shall be provided with a minimum 300 x 300mm inspection opening so that the dampers may be checked, maintained and reset when required. These inspection openings shall be covered with suitably sealed access panels.

2.15 DUCTWORK

Ductwork shall be carried out in accordance with the details shown on the Drawings and shall be fabricated from prime quality galvanised sheet steel. All duct sizes indicated on the drawings are metal sizes and include the necessary allowances for any internal insulation, which may be specified.

Ductwork shall be fabricated and installed in accordance with the following specification, which shall be read in conjunction with the standards set by the Sheet Metal and Air Conditioning Contractors National Association of America (SMACNA), which shall be adhered to in detail except only as hereinafter specified.

Rectangular ductwork sheet thickness and cross breaking shall be as follows: -

Duct Size Long side mm	**Duct Joint**	**Sheet Steel thickness mm**	**Sheet Steel gauge**	**Cross Breaking Length mm**	**Type of Intermediate Stiffener**
Up to 750	Slip & Drive	0,6	24	2400	None
Up to 760	Mez	0,6	24	2400	None
751 to 1250	Mez	0,8	22	2400	None
1250 to 2400	Mez	1,0	20	1200	Tie-Rods
Above 2400	Mez	1,2	18	1200	Tie-Rods & Flat V Top hat

Longitudinal seams shall be Pittsburgh lock on all duct sizes. Cross joints on concealed ductwork having a semi-perimeter not exceeding 1150mm shall be as follows: -

Duct Size long side mm	**Long Side**	**Short Side**
Up to 450	'S' slip	Drive Slip
460 to 750	25 mm Bar Slip	Drive Slip

Cross joints on concealed ductwork having a semi perimeter in excess of 1150mm shall be of Mez or equal flange type, installed in accordance with the manufacturer's recommendations. As an alternative to the Mez or equal flange joints, 40mm x 3mm angle flange joints may be used.

Cross-joints on all exposed ductwork shall be of Mez or equal flange type.

Panel stiffening shall either be cross breaking, beading or pleating of longest side of all ducting.

Ductwork supports shall be of rod and angle type, sheet metal straps not being permitted. The size and spacing of these supports shall be as follows: -

Duct Size long side mm	Angles mm	Rods dia mm	Spacing max - mm
Up to 750	40 x 3	6	3000
751 to 1250	40 x 3	8	3000
1251 to 2400	40 x 6	10	2400
Above 2400	50 x 6	12	2400

Rectangular ductwork shall be regarded as low velocity low-pressure ductwork suitable for pressures up to 500 Pa and velocities up to 10 m/s. It shall accordingly be fabricated and installed to comply with the above requirements and the "Low Velocity Duct Construction Standards" manual published by SMACNA.

All cross-joints in ductwork shall be sealed with a liberal coating of 3M or equal Duct Sealer. Longitudinal joints/seams exposed to weather shall be made waterproof.

All duct connections to vibrating equipment shall consist of a flanged joint, followed by a flexible connector consisting of a neoprene covered fibreglass cloth fixed on either side of the joint in a double lock seam to form an airtight flexible joint with a minimum of 50mm separation between metal edges. Ducting at flexible joints shall be so supported that the ductwork is held square with the adjoining duct and no stress is imposed upon the flexible joint. Copper earthing straps shall be fitted over all flexible duct connections and be carried out in accordance with the standard wiring regulations.

Flexible ducts shall be equal to INSULATED EUROFLEX, comprising glass fibre fabric. P.V.C. coated with spirally wound metal inserts. Where flexible ducts connect to normal sheet metal ductwork or other equipment, a liberal coating of 3M or equal Duct Sealer shall be used, the joint then sealed with

DURO - DYNE or equal 75 mm wide duct tape and finished with an approved clamp or metal strap to ensure an airtight joint.

Circular flexible ducting connected to supply air diffusers shall not exceed 1,5m in length.

All supply air ducting shall be pressure tested with a maximum permissible leakage of 5% at a test pressure of twice the working pressure.

The maximum permissible leakage rate for return and ventilation air systems shall not exceed 5%.

Kitchen canopy and fume extract air ducting systems shall be made 100% airtight.

All insulated ducting in storage or in position shall be adequately protected at all times

All ducting joints exposed to weather shall be waterproof and corrosion free.

2.16 DUCTWORK INSULATION

Ductwork shall be insulated according to the requirements noted on the Drawings and in accordance with SANS 0173, as amended.

Where noted on the Drawings, the supply air ducting shall be internally insulated with 25 mm thick "sonic liner" or equal, glued to the inside surface of the ducting with a fire retardant adhesive. In addition the insulation shall be further mechanically secured with Grip Nails or "Spotter Pins" at 450mm centres and not more than 75 mm from the edges of each panel. The insulation ends shall be covered with 0,8mm thick galvanised metal strips rivetted to the duct panels to prevent erosion of particles of the insulation into the air stream.

External supply and return air ducting shall be internally insulated with 50 mm thick "sonic liner" or equal, glued to the inside surface of the ducting and mechanically secured as specified in clause 17.2 above.

Ducting installed in open roof spaces above insulated ceilings shall, in addition to being insulated internally with 25mm thick "sonic liner" or equal in accordance with clause 16.2, be wrapped externally with 50mm thick "foil faced" or equal fibreglass insulation, unless otherwise noted on the Drawings. This external insulation shall be strapped around the ducting with strapping bands fixed at 1200 mm centres, and joints sealed with foil duct tape.

Ventilation ducting only installed above ceilings and below concrete slabs shall be un-insulated unless otherwise noted on the Drawings.

2.17 DIFFUSER, GRILLES AND LOUVRES

Air distribution shall be effected by means of ceiling diffusers or grilles of the sizes, types and having the discharge patterns as indicated on the Drawings.

Ceiling Diffusers and grilles shall be fixed to spigots extending not less than 100 mm from the ducting, unless otherwise indicated on the Drawings, and shall be securely fixed so that no screws or other fixing devices are visible.

Supply air diffusers shall be of steel construction and shall consist of an inner core which shall be easily removable from the outer section to facilitate access to the volume control damper located behind the diffuser. The inner core shall consist of concentric rectangular collars and the outer section shall consist of a single rectangular or bevel collar provided with a concealed spigot for attaching the diffuser to the supply ductwork.

The rear backing including the disc of all supply air diffusers for coastal projects, shall be lagged with minimum 3mm thick life care – fire and heat resistant foam.

Supply air diffusers shall be equal to RICKARD model CCD and CRD complete with dampers, and shall be finished in an epoxy powder coating in a colour to suit Architects requirements. Alternatively fibreglass or aluminium diffuser casings will be acceptable.

Supply air grilles shall be of the double deflection type consisting of two rows of individually adjustable aerofoil section vanes, the front vanes being horizontal and the rear vanes vertical. The vanes shall be housed in a surrounding fixing flange with neat mitred joints at the corners. The entire grille assembly shall be of extruded aluminium unless otherwise noted on the Drawings.

Supply air grilles shall be equal to Europair type DD complete with factory fitted opposed blade dampers.

The multivane opposed blade dampers provided with supply air diffusers and grilles shall be finished in matt black lacquer. The dampers shall be attached to the rear of the grilles and fitted into the spigot connections or the diffusers and shall be adjustable, by means of a key or a lever, from the front of the installed diffusers and grilles.

Return air grilles shall consist of aluminium grid core housed in an extruded aluminium-fixing flange with neat mitred corners and finished in plain anodised aluminium unless otherwise noted on the Drawings.

Return air Grilles shall be equal to Europair type RA.

Door grilles shall be extruded aluminium construction equal to Europair type DG suitable for fitting into doors of varying thickness and shall be finished in a colour to suit Architects requirements. Door grilles shall be fixed to doors by means of countersunk screws with a colour to match the door grille.

Outside air intake weather louvres shall be of the extruded aluminium fixed vane type fitted with a vermin proof screen on the rear side as well as an opposed blade damper.

Dampers shall be provided with a locking device so that once has been set for the correct airflow they can be permanently locked in position. Louvres shall be finished in plain anodised aluminium.

Where indicated on the Drawings the outside air intake louvres assembly shall be fitted with firmly fixed foam rubber gaskets and spring clips for the attachment of the fresh air filters, as later specified herein. The frames shall be fixed to the weather louvres so as to prevent any air by-passing the filters.

Rubber gaskets shall be glued to the rear of the fixing flanges of all diffusers, grilles and louvres to ensure airtight seals and prevent smudging.

2.18 FIXING OF EQUIPMENT

The Subcontractor shall identify the location of hangers and/or other support points of all equipment with a mass in excess of 25 kg to the Structural Engineer. Approval of the proposed hanging and fixing shall be obtained from the Structural Engineer, prior to carrying out the work.

All lightweight fixing to brick or concrete shall be made with steel screws and "Fischer" or other approved plugs. Holes of the required size for the plugs, which shall suit the screws used, are to be neatly drilled in the concrete or brickwork (not in the joints between bricks) to a depth excluding plaster or soft wall finish equal to at least the length of the plugs. The plug lengths shall be such that all the threaded length of the screws are in the plugs.

Fixings to timber shall be made with greased brass wooden screws. For fixing to hollow tiles, etc., screw anchor type fixings shall be used, fitted as above as far as possible. Fixing to soft or hard fibre boards, etc., which are inaccessible to the back, shall be made with sherardized self-tapping screws of appropriate sizes.

All heavy weight fixings to brick or concrete shall be by means of appropriately sized grouted galvanised bolts or by one of the various types of suitable expanding bolt fixings. After erection of equipment all exposed metalwork of fixings shall be treated with two coats of paint to match the finish of the equipment. Bolts shall in all instances be secured by means of a washer on the bolt head side and a lock washer on the nut side of the items being bolted.
Where the Subcontractor is in any way uncertain of the method of fixing of any plant or material, the proposed fixing and loading involved shall be cleared with the Engineer prior to carrying out the work on site.

2.19 VIBRATION ISOLATION

Unless otherwise noted on the equipment schedules hereafter, all mechanical equipment, i.e. machinery, piping, ducting, etc., shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure.

2.20 CORROSION PRECAUTIONS AND FINISHES

All materials such as brackets, hangers, etc., shall be shot blasted, pre painted, galvanised or treated against corrosion prior to their delivery to site. Any work that will require site cutting, etc., i.e. exposure of the bare steel to the atmosphere, shall immediately be treated by cold galvanising, painting, etc.

The method of treatment for the above shall depend on the particular environment and type of surface to be coated. The surface preparation, primer coats, finishing coats, etc. shall therefore be in accordance with those specified by reputable paint manufacturers such as Plascon, Dulux, etc.

All black steel piping, support brackets, hangers, etc., installed inside the building shall be treated with two coats of corrosion inhibitor paint prior to installation. The first coat shall be allowed to dry completely before the next coat is applied.

A further coat of corrosion inhibitor shall be applied after installation and allowed to dry completely. Two coats of enamel paint, to the Architect or Engineers specification, shall finally be applied. The first coat shall be allowed to dry completely before the next coat is applied.

All black steel piping, support brackets, hangers, etc., exposed to the weather shall be hot dipped galvanised.

All duct, supports, equipment and materials exposed to view (i.e. not in shafts, false ceiling, bulkheads, etc.) shall be cleaned, primed and then finished with two coats of enamel paint to the Architect or Engineer's specification. Each application shall be allowed to dry completely before the next coat is applied. The only exception to these stipulations shall be in the case of subcontracts, where the Subcontractor shall only apply the primer coats and the Principal Contractor the finishing coats.

Colour coding shall follow the coding currently used on site. If no colour coding is in use, or in the case of new installations, the latest SANS 10173 (clause 6) and SANS 10140 Standards shall be used.

Plant and equipment, pre painted or pre primed at the factory shall be examined to ensure that the paint finishes are in a good condition. If not satisfactory, priming paint or finishing coats shall be removed where necessary, the surface cleaned to remove rust, and all such surfaces re primed and finished in two coats of high quality paintwork to match the original.

The subcontractor shall fix black on white ivorine labels to all items of equipment (machinery, fans, pumps, electric heater batteries, humidifiers, air handling units, outdoor condensers, etc.), as well as to all active valves (motorised and solenoid) and major isolating valves.

The labels shall be screwed or pop-riveted to the equipment and attached to the valves with steel cables. The lettering shall not be less than 10 mm in height and the wording shall be approved by the Engineer. The wording and tag numbers shall be the same as those used in this specification and indicated on the drawings.

2.21 ELECTRICAL WORK

All electrical switchgear and wiring required for the proper operation of the works shall be provided by the Subcontractor.

Others will, however, provide waterproof maintenance isolators adjacent to the outdoor sections of the split units. The air-conditioning contractor will allow for the necessary wiring between the isolators and the individual units.

Maintenance Isolators shall furthermore be provided by others within 1 m of all ventilation fans. The air-conditioning contractor is to allow for the connection between these isolators and his equipment.

Others will furthermore provide the following conduits and draw boxes:

Ø20 mm Conduits with draw wires between the indoor unit and remote control station of each hide-away in ceiling split type air-conditioner.

The conduits shall terminate in 100x50 mm recessed draw boxes at the remote control sensor positions, at the height as light switch at 1 200 mm above finished floor level.

Tenderers shall indicate whether the above power supplies are sufficient or not and whether additional plug points, conduits and draw boxes are required. All costs arising from the failure to comply with this instruction will be for the Subcontractors account.

The Subcontractor shall liaise with the Principal Contractor and Electrical Subcontractor and provide all necessary assistance, information (such circuit breaker type and overload protection required), etc., to ensure that the correct power supplies are provided to the HVAC equipment. The Subcontractor shall ensure that the power supply to the equipment is installed correctly and that, once switched on, it will not damage the equipment.

All costs arising from the failure to comply with the above instructions will be for the Subcontractors account.

SECTION 4:

PROVISIONAL BILL OF QUANTITIES

SECTION 3:

BILLS OF QUANTITY

GENERAL NOTES: PROVISIONAL BILL OF QUANTITIES

1. GENERAL

1. These Bills of Quantities contain pages numbered consecutively in each Bill as indicated in the Master Index. Before the Tenderer submits his tender, he shall check the number of pages, and if any are found missing or duplicated, or the figures or writing indistinct, or the Bills of Quantities contain any obvious errors, he should notify to the Engineer at once and have same rectified, as no liability whatsoever will be admitted by the Engineer in respect of errors in tender due to the foregoing. The Bills of Quantities are provisional and no claim of loss of profit etc. will be accepted die to any change in the scope of the works. The rates shall remain fixed no matter what the change in scope, either up or down.

2. Bill of Quantities form part of and must be read in conjunction with the specification document and the drawings, which contains the full descriptions of the work to be done and material and equipment to be used. Unless otherwise described in the Bills of Quantities, reference shall be made to the Specification and drawings for the full meaning of descriptions and scope of the work to be done and materials and equipment to be used. No claims will be considered for extras where the tenderer has not read the requirements of the Standard Specification (Part 4), Drawings and the Detailed Technical Specification (Part 5) in conjunction with the Bill description and included the full requirements in the rate.

3. The responsibility for the accuracy of the Quantities written into the Provisional Bills remains with the Consulting Engineers who prepared the Bills. The Tenderer shall be relieved of responsibility of measuring quantities at the tender stage, and the tender sum submitted shall be in respect of the quantities set out in the Bills and Specification, although the tenderer will be required to make his assessment of items such as brackets, fixing etc., from details stated in the Specification and Drawings and shall include in the item prices for such small installation materials as are required for the complete installation in accordance with the Specification. It shall be noted by the tenderer that the Specification and Drawings form part of the Bills of Quantity and in interpreting the descriptions in the bills reference shall be made to the Drawings and Specification to gain a proper understanding of the full scope of each description (which description are of necessity of an abbreviated format).

4. The Priced Bills of Quantities of the successful tenderer will be checked and the Engineer reserves the right to call for adjustments to any individual price and to rectify any discrepancy whilst the total tender price, as submitted, remains unaltered.

5. The Drawings are attached in the document. Tenderers are to price in strict accordance with the Bill of Quantities Provided

6. The quantities in these Bills of Quantities are provisional and shall not be used for ordering materials. Ordering shall be done only on the basis of approved equipment submissions and approved drawings that shall be prepared by the successful sub contractor. The client will give direction for spending of funds.

7. The published national indices shall be used for this contract, if applicable.

8. At all times the Province reserves the right to determine annual expenditure on this contract within the contract period. The expenditure shall be spread over the contract period in conjunction with the progress schedule of the contractor, unless otherwise stated by the client.

9. The appropriate portion of the Preliminaries sum is payable on the percentage of work completed, unless otherwise stated by the client.

10. Unless a separate rate for the supply and for the installation of any item is specifically called for, the supply and installation costs of any item shall be fully included in the unit price. The

description of each item shall, unless otherwise stated herein, be held to include samples, making, conveying and delivering, unloading, storing, unpacking, hoisting, setting, fitting and fixing in position, cutting and waste, patterns, models and templates, plant temporary work, return of packing, establishment charges, profit and all other obligations arising our of the Conditions of Contract.

11. The rates shall include the cost of preparation of drawings, design, selection of equipment, testing, documentation, manuals, as built drawings, etc. all as necessary to meet the requirements of the specification.

12. The rates shall include all supervision, transport, overheads, etc. necessary for the execution of the works.

13. It shall be noted that the contract includes the installation of piping and wiring in confined spaces (i.e. Shafts plantrooms etc.) that will require close co-ordination with other services as well as particular sequencing of work.

14. All measurements are nett unless otherwise stated and tenderers must allow for wastage in the rates.

15. All provisional sums shall be spent as directed by the Engineer and any balance remaining shall be deducted from the amount of the contract sum.

16. All rates and prices given in the Bills of Quantities shall be nett and exclusive of VAT. Provision is made on the Form of Tender for the applicable VAT to be added.

17. Where specific product names and manufacturers names are used in the item descriptions in the Bills tenderers may offer equivalent products or other manufacturers equipment but the onus will be on the tenderer/successful contractor to prove to the Engineer that the alternative offer is indeed a product of equivalent quality and performance to the specified product / manufacturer. The Engineer reserves the right to insist on the named product or manufacturer should he not be satisfied with the alternative offer.

18. Payment of retention money, calculated in terms of clause 23 (2) (e) of the conditions of contract, shall be considered on receipt of an acceptable guarantee to the value of the full amount of the retention money stated in the said clause. If Tenderers would like to take advantage of this, they must indicate the saving which they are prepared to offer to the Province as a counter offer. Provision for this will be made in the final summary. Only guarantees issued by a recognized commercial bank or building society situated within the borders of South Africa and/or registered insurance company which id authorized by the register of insurance companies to issue unconditional guarantees, will be considered and must be submitted on the official guarantee form of the administration. This provision is only applicable to contracts when the tender amount is R 100 000.00 or more.

19. The lowest or any Tender will not necessarily be accepted.

2. METHOD OF MEASUREMENT

1. All piping support costs shall be included in the rate for piping and fittings and shall include fixing to concrete slabs, roof trusses etc. as described in the Bills of Quantity or indicated in the drawings.

2. The rate for piping shall include cutting, jointing and running joints. The lengths of piping shall be measured over/through all fittings but not over valves, pumps and in-line instruments such as strainers site glasses etc.

3. Pipe fittings are measured as extra - over piping.

4. The rate given for items of equipment AHU'S, Fan coils, pumps etc., shall include all necessary accessories and controls required to install, commission and operate the equipment in accordance with the specification.

5. The ducting for the entire project will be measured per metre squared over duct fittings and grouped according to the following Catergories:

- **Catergory 1** – width or height not exceeding 750mm and the sum of 2 adjacent sides not exceeding 1.15m
- **Catergory 2** – width or height not exceeding 750mm and the sum of 2 adjacent sides exceeding 1.15m
- **Catergory 3** – width or height exceeding 750mm and not exceeding 1.35m
- **Catergory 4** – width or height exceeding 1.35m and not exceeding 2.1m
- **Catergory 5** – width or height exceeding 2.1m

The ducting will be measured under two main Sections:

- Ventilation ducting only
- Externally Insulated Ducting

Ducting which is only wrapped will be measured as ventilation ducting, and the wrapping will be measured as a separate item.

PROJECT:	RUNNYMEDE LIBRARY - HVAC INSTALLATIONS
DOCUMENT NAME:	HVAC - Bills of Quantities
DOCUMENT NUMBER:	33738-MECH-BOQ-RUN-01-01-R0
AUTHOR:	Swesha Machere

The following signatories have approved the report:

Name	Purpose	Signature	Date
Swesha Machere	For Tender		06 Feb 24

Rev	Description	Author	Pages
0	For Tender	SM	All

No	Description	Unit	Qty	Rate	Amount
	33738-MECH-BOQ-RUN-01-01-R0 **AIR CONDITIONING AND VENTILATION PRE-AMBLE** This BOQ is to be read inconjuction with specification document Where trades names are used, it shall be read to include the phrase "or approved equal". Installation and Commissioning of air conditioning units and ducting must include for all hangers, support, condensate drains and trunking "Rate" includes material, mark-up & installation labour. All breaking and making good of building & door openings due to equipment penetrations shall be allowed for including transformations from & to fan, louvers, grills, diffusers, etc. All items on the Bill are re-measurable				

No	Description				Amount
	33738-MECH-BOQ-RUN-01-01-R0 **AIR CONDITIONING AND VENTILATION** **RUNNYMEDE LIBRARY - SUMMARY**				
A	Preliminaries and General				
B	HVAC Installation				
	TOTAL **ADD VAT (15%)** **GRAND TOTAL**				

No	Description		Qty	Rate	Amount
A	**RUNNYMEDE - PRELIMINARY AND GENERAL** Note: All items shall be priced for whatever cost may be consider necessary for Preliminary and General to carry out the Mechanical Installations in full, as detailed in the drawings, Specifications and Schedules, which shall include, but shall not be limited, to the following:				
A1	Site establishment including the removal thereof upon completion	Item	1		
A2	Compliance with OHS Regulations (latest version) and Site Specific Health & Safety Specification	Item	1		
A3	Scalfolding hire and erection	Item	1		
A4	Transportation of materials and equipment to site	per trip	3		
A5	Travelling to site	per trip	22		
A6	Accommodation for six persons	days	30		
A7	Rigging of equipment to final position	Item	1		
A8	Site Supervision and coordination with other services	Week	4		
A9	Clearing of rubble and housekeeping	Item	1		
A10	Workshop drawings and equipment submittals	Item	1		
A11	Testing, balancing, commissioning (incl. topping up with gas) and handing over in full working order of entire HVAC system(s).	Item	1		
A12	Instructing and training the Employer's staff in operation of system and equipment prior to hand over to the Client.	Item	1		
A13	Three copies of the Operation & Maintenance Manuals (hard copies and USB)	Item	1		
A13	As-Built Drawings (3 copies)	Item	1		
A14	Provision of full maintenance and guarantee of mechanical equipment and installation for the full 12 month period. The maintenance period shall start after practical completion is achieved. Service sheets to be submitted for every service carried out. Refer to tender specification.	Item	1		
	SUBTOTAL CARRIED FORWARD TO SUMMARY				

No	Description		Qty	Rate	Amount
B	**RUNNYMEDE LIBRARY - AIRCONDITIONING INSTALLATION** The supply, delivery, installation and commissioning of equipment as shall be detailed in this schedule. Tenderers are referred to the Technical Specification of this tender document.				
1	**ROOFTOP PACKAGE UNIT**				
1.1	Library Hall - 88kW Air cooled Rooftop packaged unit heatpump ideal for outdoor appllications. Supply air fan at 4531L/s & 294Pa ESP, 0.8 sensible heat factor, OA (db/wb) 34/20 ºC, Entering(db/wb) 25/18 ºC, Leaving(db/wb) 12/11 ºC,W 668L/s fresh air. The unit construction shall satisfy the requirements of standard specification	No	1		
1.2	300mm height Floor standing steel bracket complete with anti vibration pads to suite the air-handling unit	Item	1		
2	**Controls installation**				
2.1	Wall mounted remote controller	No.	1		
2.2	Return air temperature sensor	No.	1		
2.3	Supply air temperature sensor	No.	1		
2.4	Pressure sensor	No.	1		
3	**Electronic sensors, etc. including mounting brackets, bases, terminals, connections, duct openings, pipe pockets, flanges/clamps, attachments, finish of pipe/duct insulation, etc.**				
3.1	12mm PVC conduit chased into wall for room thermostat. All other conduits included with control wiring measured above.	m	25		
3.2	50mm PVC draw box chased into wall for room thermostat. All other draw boxes included with control wiring measured above.	no.	1		
4	**PVC drain piping including running joints, fittings, clamps and supports and fixing to plntroom floor.**				
4.1	32mm Diameter	m	5		
	TOTAL CARRIED FORWARD				

No	Description	Unit	Qty	Rate	Amount
	TOTAL BROUGHT DOWN				
5	**Cable tray for wiring including installation, complete with 41mm galvanised unistrut type channel and 10mm galvanised threaded rods.**				
5.1	150x150mm	m	25		
6	**Galvanised conduit for control wiring including installation**				
6.1	20mm Diameter	m	50		
7	**DX TYPE INVERTER SPLIT UNITS**				
	DX type inverter split air conditioning units complete with indoor and outdoor units. Including decorative panel, piping between indoor and outdoor portions of unit, filters, cabling, electrics, controllers, mounting brackets, condensate drain pumps, refrigerant gas and all necessary accessories and 2 meters of condensate piping.				
7.1	24000BTU Midwall Unit complete with mounting brackets and remote controller for Computer Room	No	1		
7.2	18000BTU Midwall Unit complete with mounting brackets and remote controller for Librarian	No	1		
7.3	18000BTU Midwall Unit complete with mounting brackets and remote controller for Kids Room	No	1		
7.4	24000BTU Midwall Unit complete with mounting brackets and remote controller for Study Room	No	2		
7.5	18000BTU Midwall Unit complete with mounting brackets and remote controller for Boardroom	No	1		
8	**AIR-CONDITIONING ACCESSORIES**				
8.1	Premium wired remote controller for package units	No	2		
8.2	Gas & liquid refrigerant copper piping with insulation	m	78		
8.3	Nitrogen and additional refrigerant gas	Item	1		
8.4	22-50mm dia Insulated PVC condensate drain piping	m	90		
	TOTAL CARRIED FORWARD				

No	Description	Unit	Qty	Rate	Amount
	TOTAL BROUGHT DOWN				
8.5	900 x 600 Fusible Link Fire Damper	No	2		
8.6	900 x 600 x 1000 Long sound attenuator	No	2		
8.7	100mm wide x 50mm high PVC trunking c/w cover for cabling and refrigerant piping between Indoor and outdoor unit running on the outside wall. Trunking to be painted to match background wall and include all installation ancillaries	m	100		
9	**FANS**				
9.1	Diameter 200mm in-line tube fan duty at 350L/s;200pa complete with 1.5D sound attenuators	item	1		
10	**DUCTING AND AIR TERMINALS**				
	Ducting Low pressure galvanised Rectangular ducting (incl. all fittings, balancing dampers, spigots, brackets, transformations & supports) to SANS 1238.				
10.1	Un-insulated Ducting				
	Low Pressure Galvanised ducting including flexible connections, transformation pieces, bends, shoe pieces, spogots, stop ends and all duct fittings to SANS 1238.				
	Category 1 - 0,6mm Straights & Fittings	Sqm	290		
10.2	Un-insulated flexible Ducting				
	Wire reinforced aluminium foil flexible ducting complete with clamps; duct sealant and fixings.				
	Size: 150mm Diameter	m	10		
10.3	Duct Insulation				
	Ducting external insulation - 25mm thick FRK insulation	Sqm	270		
10.4	Insulated Flexible Ducting				
	Wire reinforced aluminium foil flexible ducting complete with clamps; duct sealant and fixings.				
	Size: 300mm Diameter	m	35		
10.5	Twist diffusers with 300mm spigot	No	20		
10.6	1200x600 Return air grille with two 400mm spigots	No	4		
	TOTAL CARRIED FORWARD				

No	Description	Unit	Qty	Rate	Amount
	TOTAL BROUGHT DOWN				
11	**ELECTRICAL WORKS**				
11.1	20A single pole circuit breakers	No	3		
11.2	40A single pole circuit breakers	No	3		
11.3	30A Weatherproof isolators complete with housing	No	6		
11.4	40A double pole circuit breakers	No	1		
11.5	40A Weatherproof double pole isolators complete with housing	No	1		
11.6	Power supply cables	sum	1		
11.7	Communications	sum	1		
11.8	Intergration of HVAC with Fire system including fire relays to shut-off HVAC system and close fire damper in an event of fire.	sum	1		
11.9	Issuing of Elecctrical COC	item	1		
12	**BUILDERS WORKS**				
12.1	Construction of plith for Package unit	Item	1		
12.2	Making openings for ducting on the walls and making good	item	1		
12.3	Building fence for package unit	item	1		
12.4	Removal of ceiling and putting back	item	1		
	SUBTOTAL CARRIED FORWARD TO SUMMARY				