

TENDER DOCUMENT

Project:

ENGINEERING BUILDING, CAPE TOWN CAMPUS
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

Service:

HVAC INSTALLATION

FIXED PRICE CONTRACT

Issue/Revision	Issue 1	Revision 1	Revision 2
Remarks	Issued for tender		
Date	Refer to Main Contract		
Prepared by	Benjamin Malatji		
Signature			
Checked by	Benjamin Malatji		
Signature			
Authorised by	Leslie Green		
Signature			
Project #	J089/30		
File reference	Engineering Building – Tender Doc Rev 01		
Tenders to be submitted to:	As advertised		
Address all queries to:	Refiloe Mafatle – mafatleR@cput.ac.za		
Tender Closing Date & Time:	As per advertisement		



| DESIGN | ENGINEERING | PROJECT MANAGEMENT | PROPERTY & FACILITIES

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PART ONE

DETAILED TECHNICAL SPECIFICATION

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PART ONE

DETAILED TECHNICAL SPECIFICATION

1.1 SITE LOCATION

The site is the existing Engineering Building located at Zonnebloem, Cape Town.

1.2 LIST OF DRAWINGS

The specification documentation shall include the tender drawings:

Engineering Building

J089-30-02 Rev 1 First Floor HVAC Layout

1.3 DESCRIPTION OF WORK

This specification calls for the supply, delivery, installation, testing, commissioning, handover, guarantee and twelve months free maintenance of the new ventilation and air conditioning system required to serve the areas on the first floor level only; as detailed in the accompanying drawing(s).

The air conditioning contractor shall be responsible for offloading at site, hoisting, fixing in positioning all the equipment required to complete the installation. This shall include the provision of all labour and materials, contractor's equipment and everything whether of temporary or permanent nature, setting in operation and leaving the new system in complete working order.

1.4 PROGRAMME

A site inspection can be arranged on request. All costs entailed by the mentioned site visit will be for the contractor's account. Work on site shall commence after appointment is made, and this will be confirmed closer to the date.

Completion dates will be advised once appointment is finalised with the winning Tenderer. The air conditioning and ventilation installations shall be physically complete and capable of supplying permanent air conditioning and ventilation by these dates.

The entire air conditioning and ventilation installation must be commissioned, tested and Taken Over by the Engineer as per Principal Contract Programme.

The AC contractor shall be required within TWO WEEKS after acceptance of his Tender, to submit to the Engineer for his approval a Programme showing the order in which the Works will be executed. Such Programme shall show the times for the preparation of all drawings, ordering and delivery times promised by the suppliers for each major item of Plant, manufacturing and delivery times for all manufactured items, installation times and the programmed dates for testing and commissioning the Plant.

The Programme shall be prepared in consultation with the Principal Contractor and the execution of the Works shall be programmed so as to keep pace with the Building Programme (where applicable).

The air conditioning contractor shall submit TWO copies of his Programme to the Engineer for approval. After submission to and approval by the Engineer of such Programme, the contractor shall adhere to the order of procedure and method stated therein unless he obtains the written permission of the Engineer to vary such order or method. The submission to and approval by the Engineer of such Programme shall not relieve the contractor of any of his duties or responsibilities under the contract.

The times required for the submission of Drawings, are as follows:

Builder's Work Drawings	within TWO WEEKS
Shop Drawings	to commence within THREE WEEKS

1.5 WORK BY OTHERS

Builder's Work shall be included in this contract and all such work, as later herein specified shall be carried out by the AC contractor in accordance with the Drawings and details provided by the Engineer or as provided herein.

This shall include but not limited to:

- All equipment plinths, bases and plantrooms, where applicable
- All plant enclosures
- All penetrations through walls, slabs, ceilings and steelwork
- Making good of all openings after installation of ductwork and equipment
- Waterproofing of all duct or piping entries to building through roofs, walls or the structure, where applicable
- Undercutting doors and installing door grilles where specified.

Plumbing Works forms part of this contract:

- Water supply points terminating in valves
- Drain points.
- All as indicated on drawings.
- Any other relevant

Electrical Works:

Mains incoming power supplies to air conditioning plants made off to isolators

- Wiring to air conditioning plants (outdoor and indoor) and Change over signal
- Wall boxes and conduit in brick walls or partitions for air conditioning controls.

NOTE:

1. All final terminations in the air conditioning panels by the air conditioning contractor.
2. All air conditioning panels to be top-entry type.
3. Power distribution from air conditioning plantroom distribution boards to ceiling variable volume outlets is by the air conditioning contractor.

POWER SUPPLIES BY ELECTRICAL CONTRACTOR

1. Voltage 400/230V 5%

1.6 NOTES ON DRAWINGS

1.6.1 Tender Drawings

The Drawing(s) accompanying this Specification shall be deemed to indicate the general layout and requirements only and are not Shop Drawings.

1.6.2 Architectural and Structural Drawings

The contractor shall ensure that he is in possession of all information required for the installation of the Works and shall, if necessary, obtain copies of all relevant Architectural and Structural Drawings from the Architect and Structural Engineer.

1.6.3 Builder's Work Drawings

Builder's Work Drawings shall, as far as possible, indicate the location and extent of all foundations, bases, openings, timber frames and all other Builder's Work and the capacities and/or dimensions of all electrical and water supply points, the method of terminating such supplies and the position of the connection points, the position and dimensions for all water drainage connections and any other work to be provided by others for the Works, as detailed in these Specifications.

The Drawings shall be drawn to scale and in sufficient detail to enable the Builder to execute the work without any misunderstanding.

Within a reasonable period after receiving such Drawings, the Engineer shall signify his approval, or otherwise, and one signed copy of the approved Drawing shall be returned to the sub-Contractor.

When approved, the following number of copies of each such Drawing shall be delivered to each of the following:

Project Manager	1 Copy
Quantity Surveyor	1 Copy
Main Contractor	3 Copies
Architect	2 Copies
Structural Engineer	1 Copy
Electrical Engineer	1 Copy

1.6.4 Shop Drawings

The contractor shall submit to the Engineer, for approval within the time stipulated hereof duplicate copies of all Shop Drawings as required for the manufacture and installation of the Works or as the Engineer may reasonably require.

All Shop Drawings for work outside of plantrooms shall be drawn to a scale of not smaller than 1:50 and all Drawings of work within plantrooms shall be drawn to a scale of not smaller than 1:25. All details shall be drawn to a scale to show the detail required.

Within a reasonable period after receiving such Drawings, the Engineer shall signify his approval, or otherwise, in writing and one signed copy of each approved Drawing shall be returned to the contractor.

The contractor shall not, unless otherwise directed by the Engineer, in writing, commence with any work prior to the approval of the relative Shop Drawings. Work installed prior to the approval of Shop Drawings shall be liable to rejection by the Engineer and removal and/or replacement by the sub-Contractor, at his cost, if it is considered by the Engineer to deviate from the Specification.

The contractor shall also supply copies of all approved Drawings in accordance with the requirements (Operating and Maintenance Instructions) of the Specification.

Drawings approved as above described shall not be departed from except as authorised by the Engineer.

The Engineer shall have the right at all reasonable times, to inspect at the factory of the contractor, all Drawings of any portion of the Works.

1.6.5 Mistakes in Drawings

Any expense resulting from an error or omission in or from delay in delivery of the Drawings, shall be borne by the Subcontractor.

The contractor shall be responsible for any discrepancies, errors, or omissions in the Drawings and other particulars supplied by him, whether such Drawings and 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 by the Engineer or the Architect. The Employer shall be responsible for Drawings and information supplied in writing by the Engineer or the Architect and for the details of special work by either of them.

1.7 DESCRIPTION OF THE AIRCONDITIONING AND VENTILATION SYSTEMS

1.7.1 ENGINEERING BUILDING FIRST FLOOR LEVEL

All computer laboratories shall be served with variable refrigerant flow (VRF) indoor and outdoor units as indicated on the accompanying drawing(s) and bill of quantity.

Office spaces shall be served via DX split system.

Fresh air shall be provided and by means of axial flow fan where applicable, as indicated on the drawings.

The indoor units shall comprise a mix of cassette and high static ducted units where specified and as shown on drawings.

The indoor units shall be served by a modular, air cooled, variable refrigerant flow (VRF) condensing unit. This unit will be as indicated on the drawing.

The interconnecting refrigerant piping will be run in the ceiling void, the respective soffits and through pipe risers chased into walls. Control cables are to connect the indoor and outdoor units.

Electrical power supply to indoor and outdoor units will be provided within 3 metres of the positions of HVAC equipment and will be via 15 Amp double pole single phase isolators in general with appropriate ad hoc isolators for specific equipment (by others).

Power reticulation including any chasing and conduiting and wiring from said isolators will be the responsibility of the HVAC contractor and allowance must be made for this in the tender price.

1.7.2 TOILETS, TRANSFORMER ROOM, ELECTRICAL SWITCH ROOM AND REFUSE ROOM

Where applicable and as indicated on the drawings, these areas are to be mechanically ventilated through axial flow extract air fans and ducting systems.

1.7.3 AXIAL FLOW FANS

Axial flow fans are to be of the long casing direct drive type.

Fan casings are to be galvanised.

Fans are to be installed on anti vibration springs.

Tenderers are to base their main offer on the use of DONKIN / ZIEHL / AMS ELTA

1.7.4 ELECTRICAL SWITCHBOARDS AND WIRING

Electrical switchboards shall be constructed and wiring carried out in accordance with Part 5 of this specification and the electrical schematics which form part of this documentation.

All switchboards shall be pre-wired and tested prior to delivery to site.

Switchboards shall be wired in such a way as to provide safe sequenced and automatic start up and operation of the systems. All necessary interlock and time delay relays etc. are to be allowed in the price.

The main offer shall be based on the use of Danfoss V.L.T. 6000 variable speed drives for the variable volume unit supply fan motors.

Alternatives may be offered under separate cover.

All wiring from the air conditioning switchboards to all individual components of the air conditioning and ventilation systems is to be carried out as part of the air conditioning contract.

This includes wiring to the variable volume diffusers and their individual reheaters.

Tenderers are to allow in their price for 10% spare capacity on the number of variable volume outlets served by each switchpanel.

1.7.5 CENTRALIZED CONTROLLER

Allowance shall be made to supply, install, test and commissioning of a Graphic Central Remote Controller. It must act as an advanced air conditioning management system to facilitate complete control of VRF air conditioning equipment, It should be user friendly through its icon display and colour LCD display.

1.7.6 FILTER WASH REQUIREMENTS

This will to be provided by the client:

1.7.7 PAINTING OF DUCTWORK

All ductwork that is exposed to view, i.e. in all the air conditioning plantrooms, refuse rooms, etc., is to be degreased and painted as per the General Technical Specification.

The painting of the exposed ductwork at high level in the trusses in A/C Areas is to be specifically excluded. This will be cleaned and painted by others.

1.7.8 GENERAL

- All requirements as contained in Part 9 of this specification shall be adhered to.
- Tenderers are to allow for carrying out 12 service and maintenance visits to the plant during the first year of operation and for a full twelve months guarantee as detailed in Part IV.
- Three copies of the Operating and Maintenance Manuals and As Built Drawings, as detailed in Part 9, are required including CD (electronic format of complete manual and as-built drawings).

The tenderer is to note and make provision for the following (Apply relevant where applicable):

- Two complete set of filters, to be changed prior to the complex opening and 12 months thereafter.
- All flexible ducting carrying conditioned air shall be pre-insulated wiremold available from Europair.

1.8 DESIGN CRITERIA

1.8.1 FUNCTIONAL PERFORMANCE

<u>Outside Conditions</u>	Summer Winter	35,0°C db 21 deg°C wb 7,0°C
<u>Inside Conditions</u>	Offices All Other Areas	21, 5°C db 22,5°C db
<u>Control Tolerance</u>	All Areas	Temperature: Approximately 1.5 Deg C Relative Humidity will not be directly controlled but will indirectly be controlled within the range of 40% to 60% by careful selection of the cooling plant.
<u>Altitude</u>		sea level

NOISE LEVELS

The air conditioning and ventilation systems must be designed to maintain the background noise levels as specified below. The design target should be the first mentioned NR value. If the second NR value is exceeded, then corrective measures must be implemented.

ITEM	AREA	NR LEVEL	DESIGN dBA	MAX dBA
1.	Offices	25-30	30	35
	Boardrooms	30-35	35	40
	Executive Offices	35-40	40	45
	Secretaries and General Offices	25-30	30	35
2.	Meeting Rooms	35-40	30	35
3.	Restaurants	35-40	40	45
4.	Retail Shops	35-40	40	45
5.	Public Concourses	35-40	40	45
6.	Lounges	35-40	40	45
7.	Kitchens	45-50	50	55
8.	Toilets	40-45	45	50
9.	Stairwells/Corridors			
	To service areas	40-45	45	50
	To function areas	35-40	40	45
10.	Plant rooms			
	Air Handling Units	70-75	75	80
	Main Chiller	75-80	80	85
11.	Site Boundary	40-45	45	50

MEASURES TO REDUCE NOISE AND VIBRATION

- In plant rooms on the ground floor, all equipment is to be placed on spring mounts with a minimum deflection of 10 mm.
- The chiller is to be placed on inertia bases, equal to the chiller mass, on spring mounts and neoprene strips.
- Piping and ducting to be hung on springs mounts inside Plant rooms and then for a distance of 10 m outside the respective plant room.
- Where attenuators are fixed into walls, canvas collars are to be placed on noise sensitive side.
- Where piping and ducting pass through walls, they are to be wrapped with high density (64 - 103 kg/m³) preformed, resin-bonded glass wool of 25 mm thickness and then with thick Builder's plastic. Grouting is then to be done hard-up to the plastic.
- Double hemispherical flexible couplings are to be used on piping connections to chillers, pumps, etc.

DUCT DESIGN AIR VELOCITY

NR LEVEL	TERMINAL DUCTS	BRANCH DUCTS	MAIN DUCTS	ATTENUATOR PASSAGES
45	5	7.1	10	20
40	4	6	8	20
35	3.5	5	7.1	16
30	2.8	4	5.7	12.5
25	2.2	3.1	4.5	10
20	1.8	2.6	3.6	10

Velocities are indicated in m/s.

Terminal ducts are those onto which grilles and diffusers are connected.

1.9 DEFINITIONS & ABBREVIATIONS

Definitions of terms used herein:

"Provide" To supply, install, connect and hand over complete and ready for safe and regular operation of particular work referred to unless specifically indicated otherwise.

"Install" To erect, mount and connect, complete with all related accessories.

"Supply" To purchase, procure, acquire and deliver, complete with all related accessories.

"Work" All labour, materials, equipment, apparatus, controls, accessories and other items required for correct and complete installation.

"Piping" Pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, accessories, drains, insulation and all related items.

"Wiring" Conduit, fittings, cables, wire, junction and outlet boxes, switches, cut-outs, socket outlets and all related items.

"Concealed" Embedded in masonry or other construction installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosed spaces.

"Exposed" Not installed underground or concealed as defined above.

"Indicated", "Shown" or "Noted" As indicated, shown or noted on drawings and/or specifications.

"Similar" or "Equal" Of approved manufacture, equal in weight, size, design and efficiency of performance of the product specified or mentioned by name.

"Approved", "Satisfactory", "Accepted" As approved, satisfactory or accepted by the Engineer.

"SABS" South African Bureau of Standards.

"BSI" British Standards Institution

"ASHRAE" American Society of Heating, Refrigeration and Air Conditioning Engineers.

"ASME" American Society for Testing Materials

"ASA" American Standards Association

"NBS" National Bureau of Standards (U.S.A.)

"NEMA" National Electrical Manufacturers Association

PART TWO

FIXED PRICE BILL OF QUANTITIES

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PART TWO

FIXED PRICE - BOQ (SUMMARY)

BILL OF QUANTITY
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY ENGINEERING BUILDING FIRST FLOOR
VENTILATION AND AIRCONDITIONING INSTALLATION

SUMMARY OF COSTS

ITEM	DESCRIPTION	AMOUNT (RAND)
1	SECTION A - PRELIMINARIES AND GENERAL	R -
2	SECTION B - VENTILATION	R -
3	SECTION C - AIR CONDITIONING	R -
4	SECTION D - ELECTRICAL & BUILDER'S WORK	R -
SUB-TOTAL		R -
15% VAT		R -
GRAND TOTAL		R -

PRICE ON PRELIMINARIES AND GENERALS

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY - ENGINEERING BUILDING FIRST FLOOR

- SECTION A -

VENTILATION AND AIRCONDITIONING INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY.	RATE	AMOUNT
1	<u>BILL 1</u>				
1.1	Clearance of Rubbish		1		
1.2	Retention interest		1		
1.3	Site Establishment & Clearance		1		
1.4	Scaffolding		1		
1.5	Performance Guarantee		1		
1.6	Payment Guarantee		1		
1.7	Staff organisation		1		
1.8	Progress for Measurement		1		
1.9	Attendance for Measurement		1		
1.10	Tests and Site Inspections		1		
1.11	Preparation of Operating and Maintenance Manuals		1		
1.12	As-built Drawings		1		
1.13	12 Months Guarantee & Maintenance		1		
1.14	Programming of the Work		1		
1.15	Testing and Commissioning		1		
1.16	Equipment Submissions for Approval		1		
1.17	Contract Drawings		1		
1.18	Contract Management		1		
1.19	Office Administration		1		
1.20	Van and Car Trips		1		
1.21	Rigging of equipment		1		
1.22	Equipment Labels		1		
1.23	Overtime and Acceleration		1		
1.24	Power for Commissioning		1		
1.25	Client Staff Training		1		
1.26	Other (Specify):				
a)					
b)					
c)					
TOTAL CARRIED TO SUMMARY (PRELIMINARIES & GENERAL)					R -

DETAILED - FIXED PRICE BILL OF QUANTITY					
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY - ENGINEERING BUILDING FIRST FLOOR					
- SECTION B -					
VENTILATION INSTALLATION			DRAWING No. J089/30/2 Rev 01		
ITEM	DESCRIPTION	UNIT	QTY.	RATE	AMOUNT
1	EQUIPMENT				
1.1	VENTILATION FANS Supply, Installation, Testing and Commissioning of Ventilation Fans complete with suitable <u>Sound Attenuators</u> , hanger rods and support brackets, anti-vibration rubber mounts, and all required accessories to successfully operate.				
1.1.1	Fan 1 - Fresh Air 1424l/s @ 300Pa (Axial flow fan diam 630)	No	1	R	-
1.1.2	Fan 2 - Fresh Air 2197 l/s @ 300Pa (Axial Flow fan diam 710)	No	1	R	-
1.1.3	Fan 3 - Extraction 90l/s @ 150Pa (Inline tube fan diam 150)	No	4	R	-
1.2	VENTILATION FAN CONTROLLERS Supply and install on/off controllers for ventilation fans complete with control wiring, wireways and all required accessories.				
1.2.1	Fresh Air Fans - Timers	No	2	R	-
1.2.2	Extract Fans - Motion Sensors with 30 minutes rundown timer	No	12	R	-
2.	AIR DISTRIBUTION				
2.1	VENTILATION DUCTWORK Supply, Installation, Testing of factory fabricated Circular ductwork complete with fire retardant gaskets, wire rope suspension arrangement, I supports etc and all require accessories. In accordance with the approved shop drawings and specifications.				
2.1.1	Diam 150	m ²	15,85	R	-
2.1.2	Diam 200	m ²	78,57	R	-
	Diam 250	m ²	9,50	R	-
	Diam 300	m ²	10,88	R	-
2.1.3	Diam 350	m ²	17,32	R	-
2.1.4	Diam 400	m ²	29,63	R	-
2.1.5	Diam 500	m ²	9,57	R	-
	Diam 550	m ²	17,29	R	-
	Diam 600	m ²	16,04	R	-
2.1.4	Diam 650	m ²	18,80	R	-
2.2	EXTRACTION DUCT WORK Supply, Installation, Testing of factory fabricated Circular ductwork complete with fire retardant gaskets, wire rope suspension arrangement, supports etc. and all require accessories. In accordance with the approved shop drawings and specifications.				
2.2.1	Diam 150	m ²	11,77	R	-
2.2.2	Diam 200	m ²	13,53	R	-
2.3	WEATHER LOUVRES Supply and Installation of Weather Louvres of powder coated /anodised extruded aluminium.				
2.3.1	Fresh Air @1425 l/s - 1350 x 700	No	1	R	-
2.3.2	Fresh Air @ 2197 l/s - 1500 x 1000	No	1	R	-
2.3.3	Extract Air @ 90 l/s - 300 x 200	No	4	R	-
2.4	FRESH AIR FILTERS Supply and Installation of Fresh Air Filters				
2.4.1	Fresh Air @1425 l/s - 1350 x 700	No	1	R	-
2.4.2	Fresh Air @ 2197 l/s - 1500 x 1000	No	1	R	-
2.5	DISC VALVES Supply, Installation, Testing & Balancing of disc valves complete with metal duct clamps, maximum 1500mm long flexible ducting, fixed air distribution grid, removable key-operated volume control damper.				
2.5.1	Ø150	No	4	R	-
2.5.2	Ø200	No	17	R	-
2.6	DOOR GRILLES Supply and installation of door grilles complete with making good after installation				
2.6.1	400x200	No	8	R	-
2.7	VOLUME CONTROL DAMPERS Supply, Installation, Testing & Balancing of volume control dampers complete with all required accessories				
2.7.1	Ø250	No	2	R	-
2.7.2	Ø300	No	5	R	-
2.8	OTHER (Specify):				
(i)				R	-
(ii)				R	-
TOTAL CARRIED TO SUMMARY (SECTION A - VENTILATION)				R	-

DETAILED - FIXED PRICE BILL OF QUANTITY					
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY - ENGINEERING BUILDING FIRST FLOOR					
- SECTION C -					
AIRCONDITIONING INSTALLATION			DRAWING No. J089/30/2		
ITEM	DESCRIPTION	UNIT	QTY.	RATE	AMOUNT
3	EQUIPMENT - DAIKIN OR EQUAL AND APPROVED				
3.1	VRF OUTDOOR UNITS - HEAT PUMP Supply, Installation, Testing and Commissioning of air cooled variable refrigerant flow modular type condensing units, each comprising of multiple scroll compressors all inverter driven, full charge of refrigerant gas (R-410a), lubricating oil and all accessories as per the specifications. The condensing units shall be suitable to work on heating/ cooling mode. The condensing units shall be suitable for operation on 400 ± 10% volts, 50Hz, 3 phase AC power supply and the condensing units shall be of following capacities: NOTES: The above mentioned outdoor units shall be provided with anti corrosion treatment (bluechem or Equal and Approved). The quoted price shall be inclusive of same.				
3.1.1	AC Outdoor Unit - OU_1 (69,0 kW)	No	1		R -
3.1.2	AC Outdoor Unit - OU_2 (6,4 kW)	No	1		R -
3.1.3	AC Outdoor Unit - OU_3 (35,0 kW)	No	1		R -
3.1.4	AC Outdoor Unit - OU_4 (5,0 kW)	No	1		R -
3.2	VRF INDOOR UNITS Supply, Installation, Testing and Commissioning of variable refrigerant flow modular type indoor units wired/wireless remote suitable for R410a refrigerant comprising of all accessories as per the specifications. The indoor units shall be suitable to work on cooling as well as heating mode. The minimum Energy Efficiency Ratio shall be as per ASHRAE STANDARDS 90.1 -2001 table 6.2.1B. The indoor units shall be suitable for operation on 220 ±6% volts, 50Hz, 1 phase AC power supply. Ductable indoor units shall be suitable to handle extent of ductwork as shown in the design drawings and dehumidified air quantity as mentioned in the heat load summary sheet under "Special Conditions". The indoor unit shall be complete with pre filter & remote as per requirement The indoor units shall be of following capacities:				
	SYSTEM 1 - COMPUTER LABS				
3.2.1	Ducted Hide Away Unit - AC_1.01 (11,60 kW)	No	1		R -
3.2.2	Ducted Hide Away Unit - AC_1.02 (15,30 kW)	No	1		R -
3.2.3	Ducted Hide Away Unit - AC_1.03 (16,00 kW)	No	1		R -
3.2.4	Ducted Hide Away Unit - AC_1.04 (9,04 kW)	No	1		R -
3.2.5	Ducted Hide Away Unit - AC_1.05 (16,20 kW)	No	1		R -
	SYSTEM 2 - OFFICE SPACE				
3.2.6	4-Way Cassette Unit - AC_1.06 (6,40 kW)	No	1		R -
	SYSTEM 3 - COMPUTER LABS				
3.2.7	Ducted Hide Away Unit - AC_1.07 (15,70 kW)	No	1		R -
3.2.8	Ducted Hide Away Unit - AC_1.08 (18,60 kW)	No	1		R -
	SYSTEM 4 - OFFICE SPACE				
3.2.9	4-Way Cassette Unit - AC_1.18 (6,40 kW)	No	1		R -
3.3	AC UNITS CONTROLLERS Supply, install wall mounted wired AC Unit controllers complete with control wiring, wireways and all required accessories.				
	SYSTEM 1 - COMPUTER LABS				
3.3.1	Ducted Hide Away Unit - Controllers	No	5		R -
	SYSTEM 2 - OFFICE SPACE				
3.3.2	4-Way Cassette Unit - Controllers	No	1		R -
	SYSTEM 3 - COMPUTER LABS				
3.3.3	Ducted Hide Away Unit - Controllers	No	2		R -
	SYSTEM 4 - OFFICE SPACE				
3.3.4	4-Way Cassette Unit - Controllers	No	1		R -

**Pricing continues on the next page

3.4	COPPER PIPING (REFRIGERANT PIPING) Supply, Installation, Testing & Commissioning of high pressure copper refrigerant piping suitable for R 410a refrigerant of suitable size as required and duly insulated with Amaflex or Equal and Approved insulation. External Refrigerant piping shall be in trunking to protect from UV light damage. Piping inside occupied spaces shall be supported using wire mesh basket tray. The cost of trunking, cable trays, fittings and supports to be included in the quoted price. Entire refrigerant piping work be carried out in accordance with the specifications.				
3.4.1	AC Outdoor Unit - OU_1	m	27,80		R -
3.4.2	Ducted Hide Away Unit - AC_1.01	m	11,50		R -
3.4.3	Ducted Hide Away Unit - AC_1.02	m	13,20		R -
3.4.4	Ducted Hide Away Unit - AC_1.03	m	61,20		R -
3.4.5	Ducted Hide Away Unit - AC_1.04	m	14,70		R -
3.4.6	Ducted Hide Away Unit - AC_1.05	m	50,37		R -
3.4.7	AC Outdoor Unit - OU_2				
3.4.8	4-Way Cassette Unit - AC_1.06	m	27,14		R -
3.4.9	AC Outdoor Unit - OU_3	m	27,25		R -
3.4.10	Ducted Hide Away Unit - AC_1.07	m	15,18		R -
3.4.11	Ducted Hide Away Unit - AC_1.08	m	30,00		R -
3.4.12	AC Outdoor Unit - OU_4				
3.4.13	4-Way Cassette Unit - AC_1.18	m	23,00		R -
3.5	CONDENSATE DRAIN PIPES (CPVC) Supply & installation, testing and commissioning of Rigid heavy class CPVC piping complete with fittings, supports as per specifications.				
	Diam 25mm	m	23		R -
	Diam 63mm	m	100		R -
3.6	CENTRALIZED CONTROLLER Supply, installation, testing & commissioning of the Graphic central remote Controller. It must act as an advanced air conditioning management system to facilitate complete control of VRF air conditioning equipment, It should be user friendly through its icon display and color LCD display.				
	Central Remote Controller	No	1		R -
4	AIR DISTRIBUTION				
4.1	AIR CONDITIONING DUCTWORK Supply, Installation, Testing of factory fabricated Circular Ductwork complete with fire retardant gaskets, slip on flanges, wire rope suspension arrangement, perforated 'C' channel supports etc. in accordance with the approved shop drawings and specifications.				
4.1.1	Room 1.01				
	Diam 300	m ²	8,10		R -
	Diam 350	m ²	9,60		R -
	Diam 450	m ²	2,81		R -
4.1.2	Room 1.02				
	Diam 250	m ²	10,30		R -
	Diam 350	m ²	12,00		R -
	Diam 400	m ²	5,40		R -
	Diam 500	m ²	3,61		R -
4.1.3	Room 1.03				
	Diam 250	m ²	14,63		R -
	Diam 350	m ²	7,21		R -
	Diam 450	m ²	3,74		R -
	Diam 500	m ²	3,43		R -
4.1.4	Room 1.04				
	Diam 250	m ²	13,60		R -
	Diam 350	m ²	2,50		R -
	Diam 350	m ²	3,00		R -
	Diam 400	m ²	2,75		R -

**Pricing continues on the next page

4.1.5	Room 1.05					
	Diam 250	m ²	15,54		R	-
	Diam 350	m ²	3,92		R	-
	Diam 450	m ²	5,10		R	-
	Diam 500	m ²	2,53		R	-
	Diam 550	m ²	2,88		R	-
4.1.6	Room 1.07					
	Diam 250	m ²	14,01		R	-
	Diam 350	m ²	20,61		R	-
	Diam 450	m ²	3,74		R	-
	Diam 500	m ²	3,43		R	-
4.1.7	Room 1.08					
	Diam 300	m ²	19,94		R	-
	Diam 350	m ²	3,80		R	-
	Diam 450	m ²	4,71		R	-
	Diam 550	m ²	3,85		R	-
	Diam 600	m ²	4,77		R	-
4.2	AC DUCT INSULATION Supply and Installation thermal insulation of ducting					
	50mm FRK Foil Faced Fibreglass insulation	m ²	211,51		R	-
4.3	DIFFUSERS Supply, Installation, Testing & Balancing of square supply air diffusers complete with metal duct clamps, maximum 1500mm long flexible ducting, fixed air distribution grid, removable key-operated volume control damper.					
4.3.1	CCD200 - Ø250	No	32		R	-
4.3.2	CCD200 - Ø300	No	12		R	-
4.4	RETURN AIR GRILLES Supply and installation of return air grilles complete with OBDs, plenum boxes and insulated flexible ducting maximum 1500mm long.					
4.4.1	RCV 495x495	No	6		R	-
4.4.2	RCV 595x595	No	6		R	-
4.4.3	RCV 595x1195	No	2		R	-
4.5	OTHER (Specify):					
4.5.1					R	-
4.5.2					R	-
4.5.3					R	-
TOTAL CARRIED TO SUMMARY (SECTION B - AIR CONDITIONING)					R	-

DETAILED - FIXED PRICE BILL OF QUANTITY					
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY - ENGINEERING BUILDING FIRST FLOOR					
- SECTION D -					
VENTILATION AND AIR CONDITIONING INSTALLATION			DRAWING No. J089/30/2		
ITEM	DESCRIPTION	UNIT	QTY.	RATE	AMOUNT
5.	ELECTRICAL INSTALLATION AND BUILDER'S WORK				
5.1	ELECTRICAL ISOLATORS Supply and installation of electrical weather proof isolators complete with all required accessories for:				
5.1.1	OU Units	No	4	R	-
5.1.2	Indoor AC Units	No	9	R	-
5.1.3	Fans	No	6	R	-
5.2	ELECTRICAL DB Supply and Installation of electrical DB for AC Units and Fans complete with wiring, wireways and all required accessories				
5.2.1	Ventilation and Air Conditioning DB	No	1	R	-
5.2.2	Other (Specify):				
(i)				R	-
(ii)				R	-
5.3	BUILDER'S WORK Making penetrations through walls for weather louvres, ducting and piping complete with making good after installation (Where Applicable)				
5.3.1	Plinths for Outdoor Units	No	2	R	-
5.3.2	Door Undercut:	No	27	R	-
5.3.3	Other (Specify):				
(i)				R	-
(ii)				R	-
TOTAL CARRIED TO SUMMARY (ELECTRICAL & BUILDER'S WORK)				R	-

PART THREE

NOTICE TO TENDERERS

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3.1 UNCERTAINTIES

Uncertainties and doubts as to the meaning and interpretation of items in these documents and drawings shall be referred to the Malatji & Associates for explanation and, if necessary, correction before Tenders is submitted.

3.2 ACCEPTANCE OF TENDER

The lowest or any Tender will not necessarily be accepted. Any Tender which does not comply with the requirements stated in these documents may be considered invalid. Tenderers may include with their Tenders any descriptive matter which, if referred to in the Tender, will form part of the Tender. In case of any discrepancy, however, the issued Tender and Contract documents and information completed therein by the Tenderer, will be considered as the valid and binding Tender.

3.3 COPYRIGHT

No part of any document enclosed with this enquiry may be copied, photographed or repeated in any manner or by any process, without the written consent of the Malatji & Associates. Copyright is reserved on all designs, specifications, patents and patentable designs, systems and processes contained in the documents and drawings. The person, firm, body or contractor to whom these documents are issued or made available, shall be held responsible jointly and severally, in their personal and corporate capacities for any contravention of this requirement for tendering and/or copyright clause contained in the documents.

3.4 ELECTRONIC SUBMISSIONS

Tender(s) shall be submitted electronically to the parties described in Tender Details' page.

3.5 SUBMISSION OF TENDERS

Tenders shall be submitted on the Form of Tender accompanied by all the documents issued herewith duly completed. The Tenders will be opened by the Employer or the Employer's Representative in public immediately after the closing time on the date and the place advertised and/or set out in the enquiry. Only Tender prices entered in the Form of Tender will be disclosed.

3.6 VALIDITY OF TENDERS

Tenders shall hold good for 45 (forty five) days from the closing date stated in the enquiry. During the validity period Tender prices shall not be altered, amended or withdrawn during that period. The lowest tender will not necessarily be accepted.

The period for which tenders must remain valid is calculated from the closing date of tenders, but does not include it, and in the event of such period expiring on a Sunday, Public Holiday or another day on which the offices are closed, such tenders must remain valid until the closing time of the first day of the office following such expiry date.

3.7 SCHEDULES TO BE COMPLETED

All schedules to these documents shall be filled in and completed by Tenderers to the extent indicated in the document. Non-compliance with this requirement may invalidate a Tender.

3.8 SCHEDULE OF SUBCONTRACTS

The Tenderer shall state in the Schedule of Proposed Subcontractors the name of any Subcontractors he proposes to employ to assist him to complete the Works and the proposed extent of the Subcontractor's responsibilities.

3.9 OTHER OFFERS

If the Tenderer wishes to submit other offers in place of any of the provisions set out in this document, he shall set out details of his proposals in an accompanying letter.

3.10 VALUE ADDED TAX

Tenderers shall allow for Value Added Tax in the Tender prices as indicated in the Form of Tender and, if applicable, the Schedule of Quantities. Should the percentage tax be adjusted during the currency of the contract, the increase or decrease will apply only to such materials as have not been purchased at the date of the change.

3.11 INSPECTION ON SITE

The Tenderer shall inspect and examine the site and its surroundings and shall satisfy himself before submitting his Tender as to the nature of the ground and sub-soil so far as is practicable, the form and nature of the Site, the quantities and nature of the work and materials necessary for the completion of the Works and the means of access to the Site as well as the accommodation he may require; and in general shall himself obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect his Tender.

All costs associated with such inspection shall be for the tenderer's account.

3.12 SUFFICIENCY OF TENDER

The Tenderer shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the Works and of the rates and prices he has stated in the Schedules which rates and prices shall cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works.

3.13 RATES / PRICES

The rates and prices inserted in the Contract Documentation shall be deemed to include, but shall not be limited to the following:

- materials, workmanship and utilization of plant and equipment,
- transport, unloading, storing and hoisting to all levels of all materials,
- temporary works,
- cutting and waste,
- overhead charges and profit,

- stoppage for inspection purposes by the Principal Agent or Engineer,
- overtime working necessary to complete the Works within the time for completion.

Value Added Tax shall not be included with the rates and prices, but shall be shown separately on the Form of Tender.

3.14 OCCUPATIONAL HEALTH AND SAFETY ACT

Tenderers must note, and make provision for, the fact that the successful tenderer will be required to execute the contract works in strict compliance with the relevant clauses of the *Occupational Health and Safety Act*.

PART FOUR

TENDER PRICING SCHEDULE

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PART FOUR

TENDER PRICING SCHEDULE (FIXED PRICE)

4.1 GENERAL NOTES

This Tender Price Schedule contains pages numbered consecutively in each section as indicated in the Master Index. Before the Tenderer submits his tender he should check the number of pages, and if any are found missing or duplicated, or the figures or writing indistinct, or the Tender Price Schedule contains any obvious errors, he should apply to the Engineer immediately 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 Tender Price Schedule forms part of, and must be read in conjunction with the Specification, which document contains a full description of the work to be done and material and equipment to be used. Unless otherwise described in the Tender Price Schedule, reference should be made to the Specification for the full meaning and description of work to be done, and materials and equipment to be used in this service. The tender prices shall be based on the equipment as specified in Part 7 of this specification and on the drawings. Prices for alternative makes of equipment shall be provided separately.

The total of the Tender Price Schedule constitutes the basis of evaluation and comparison of tenders.

Tenderers are advised to check their total additions, as no claim for arithmetical errors will be considered.

No alteration, erasure nor addition is to be made in the text of the Tender Price Schedule. Should any alteration, erasure or addition be made, it will not be recognised, but the original wording of the Tender Price Schedule will be adhered to.

The priced Tender Price Schedule for the successful tender will be checked and the Engineer reserves the right to call for adjustments to any individual price to rectify any discrepancies whilst the total tender prices, as submitted, remains unaltered.

The tenderer is 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 Parts 6 and 7 of the specification and as indicated on the drawings, although he/she will be required to make his/her assessment of items such as brackets, fixings, etc., from details stated in the specification and on the drawings and shall include in the prices for such small installation materials as are required for the complete installation in accordance with the Specification.

Variations in the scope and extent of the work included in the Tender Price Schedule shall be allowed to meet the Employer's requirements and shall be measured and costed at rates entered in the Tender Price Schedule and in Part 9, where appropriate, and shall form an addition to or deduction from the total of the Tender Price. Any items or variation for which prices have not been included in the Tender Price Schedule shall be agreed and priced as non-scheduled items in accordance with the provisions of the contract.

Variations to the planning before the work has been executed shall be priced as above. Alterations to work already executed cannot necessarily be priced as above and must be reviewed on its merits.

All contingency and/or Provisional Sums (if applicable) shall be expended as directed by the Engineer and any balance remaining shall be deducted from the amount of the contract sum.

No work for which "provisional" items are provided shall be commenced without written instructions from the Engineer.

The prices and rates quoted under this section shall be deemed to include all the Equipment, Materials and Labour required to carry out works specified and to comply with Site Requirements and Conditions and Local Regulations and Legislation.

Prices and Rates shall include:

- (a) Net cost of materials and equipment necessary for each item and system and delivered on site (including 15% VAT).
- (b) Net cost of labour as necessary for each item.
- (c) All temporary works, stocking, scaffolding, tooling, hoisting and rigging, transport on site, handling, waste, travelling time etc., not included in the preliminary and general provisions for the Subcontract.
- (d) Profit and Overhead.
- (e) Drafting, Engineering & Contract Management.
- (f) All costs to comply with the rules and regulations of the Occupational Health and Safety Act.

All the costs associated with the following must be listed as separate costs in the Tender Price Schedule:

- (a) Preliminary & General Costs
- (b) Hoisting, Rigging and Cranage (where applicable)
- (c) Value Added Tax (at 15%)

4.2 ENGINEERING BUILDING:

	<u>Description</u>	<u>Labour</u>	<u>Materials</u>	<u>Total</u>
4.2.1	Supply and installation of the main air conditioning and ventilation system to the FIRST FLOOR LEVEL	R.....	R.....	R.....
4.2.5	Sub Total			R.....
4.2.6	Supply only one set of spare filter panels and one set of filters panels for testing and commissioning			R.....
4.2.7	Testing, balancing and commissioning of all the AC & ventilation systems			R.....
4.2.8	O&M Manuals (complete with "As-built" drawings & diagrams)			R.....
4.2.9	12 Months free maintenance and guarantee			R.....
4.2.10	Preliminary & General Items			R.....
4.2.11	Hoisting, Rigging & Cranage			<u>R.....</u>

TOTAL TENDER AMOUNT FOR ENGINEERING BUILDING LEVEL 1 (FIXED PRICE)

R.....
(Carried forward to Price Summary)

4.3 PRICE SUMMARY:

4.3.1	Engineering Building		R.....
	Sub Total		R.....
	Add VAT @ 15%		<u>R.....</u>

TOTAL TENDER AMOUNT – INCL. VAT (FIXED PRICE) R.....
(Carried forward to JBCC 2000 "FORM OF TENDER")

PART FIVE

SCHEDULE RATES

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PART FIVE

SCHEDULE OF RATES

(APPLICABLE TO TENDER PRICES AND FOR UNSCHEDULED WORK)

5.1 GENERAL

5.1.1 Unit price schedule, to be filled in by tenderers

Including:

Supply	Delivery
Installation	Profit
Wastage	Administration
Office Expenses	Drawing office expenses

5.2 SHEET METAL, INSULATION & PAINTING

5.2.1 Sheet metal - including supports, hangers, joints, price based on rate of sheet metal installed:

0,6 mm thick	R...../per m ²
0,8 mm thick	R...../per m ²
1,0 mm thick	R...../per m ²
1,2 mm thick	R...../per m ²

5.2.2 Cost to be added to above for external 25 mm thick foil faced fibre glass (FRK) insulation. R...../m²

5.2.3 Cost to be added to above for internal 25 mm thick Sonic Liner insulation R...../m²

5.2.4 Cost to be added to above for external 30 mm thick high density polystyrene boards covered and coated with fibreglass mat and coloured resin coat R...../m²

5.2.4 Cost to be added to above for painting of sheet metal & spiral ducting (including cleaning, preparation, primer coat, under coat and two final coats) R...../m²

5.3 SPIRAL DUCTING

Including supports, hangers, joints, price based on the lengths installed.

1250 dia.	R...../m
1120 dia.	R...../m
1000 dia.	R...../m
900 dia.	R...../m
800 dia.	R...../m
710 dia.	R...../m
630 dia.	R...../m
560 dia.	R...../m
500 dia.	R...../m
450 dia.	R...../m
400 dia.	R...../m
355 dia.	R...../m
315 dia.	R...../m
250 dia.	R...../m
200 dia.	R...../m
160 dia.	R...../m
100 dia.	R...../m

5.4 PIPING (Drain & Refrigerant)

5.4.1 Soft drawn copper – Refrigeration & Drain Piping - (insulated)

	Per m Straight Length	Per Elbow	Per Equal Tee	Per Reducer
10 dia.	R	R	R	R
13 dia.	R	R	R	R
16 dia.	R	R	R	R
19 dia.	R	R	R	R
22 dia.	R	R	R	R
28 dia.	R	R	R	R
35 dia.	R	R	R	R

5.4.2 Galvanised Drain Piping – (insulated)

25 mm dia.	R...../m length
32 mm dia.	R...../m length
40 mm dia.	R...../m length

5.4.3 PVC Drain Piping – (insulated)

12 mm dia. R...../m length
 22 mm dia. R...../m length
 32mm dia. R...../m length

5.5 PRICE FOR LABOUR

Including bonus, profit, compulsory contributions, overhead, supervision, administration and drawing office time:

TYPE	PER HOUR (R)
Erector (Artisan & 2 Labourers)	R
Fitter (Pipe fitter & 1 Labourer)	R
Electrician	R
Other (specify)	R

5.6 TRAVELLING

Distance from office/ workshop to sitekm
 Travelling charges R/km

5.7 PRICE FOR MATERIALS

SCHEDULED:

Including overheads and profit:

Capital Items: Cost plus%
 Regular Materials: Cost plus%
 Subcontractors, crantage, etc. Cost plus%

UNSCHEDULED:

Including overheads and profit:

Capital Items: Cost plus%
 Regular Materials: Cost plus%
 Subcontractors, crantage, etc. Cost plus%

5.8

DECLARATION

I hereby certify that the above information is true and correct.

Signature of Tenderer _____

Name _____

Firms name _____

Address _____

Telephone No. _____

Dated this _____ day of _____ 2019

Witnesses 1. _____

2. _____

Company Stamp