REPUBLIC OF KENYA

PRIVATIZATION COMMISSION

PROPOSED PARTITIONING WORKS FOR PRIVATIZATION COMMISSION AT NSSF ANNEX

W.P. ITEM NO. D 107/ NB/NB/1902 JOB NO.10759 A

VOLUME 3 OF 4

SPECIFICATIONS AND BILLS OF QUANTITIES
FOR
SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING
OF
AIR CONDITIONING WORKS

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VOLUME 3 OF 4

SPECIFICATIONS AND BILLS OF QUANTITIES
FOR
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OF
AIR CONDITIONING WORKS

SECTION B:

GENERAL MECHANICAL SPECIFICATIONS

SECTION B

GENERAL MECHANICAL SPECIFICATION

GENERAL MECHANICAL SPECIFICATION

2.01 General

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

2.02 Quality of Materials

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

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

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

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

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

2.03 Regulations and Standards

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

a) The Kenya Government Regulations.
a) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.
b) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
c) British Standard and Codes of Practice as published by the British Standards Institution (BSI)
e) The Local Council By-laws.
f) The Electricity Supply Authority By-laws.
g) Local Authority By-laws.
h) The Kenya Building Code Regulations.
i) The Kenya Bureau of Standards

2.04 Electrical Requirements

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

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

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

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

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

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

2.05 **Transport and Storage**

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

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.
Adequate measures shall be taken by the Sub-contractor to ensure that plant and equipment do not suffer any deterioration during storage.

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

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

2.06 **Site Supervision**

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

2.07 **Installation**

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

2.08 **Testing**

2.08.1 General

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

2.08.2 Material Tests

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

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

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

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

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

2.08.3 Manufactured Plant and Equipment – Work Tests

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

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

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

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

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

2.08.4 Pressure Testing

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

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

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

2.09 **Colour Coding**

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

2.10 **Welding**

2.10.1 Preparation

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

2.10.2 Method

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

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

2.10.3 Welding Code and Construction

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

a) Pipe Welding

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

b) General Welding

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

2.10.4 Welders Qualifications

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

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

SECTION C:

PARTICULAR SPECIFICATIONS
FOR
AIR CONDITIONING

Table of Contents

Particular Specification for Air Conditioning

PARTICULAR SPECIFICATIONS FOR AIR CONDITIONING SYSTEMS

SCOPE OF WORKS

The works to be carried out comprises of the supply, delivery, installation, setting to work, testing and commissioning of all materials and equipment called for in this specification and/or shown in the contract drawings.

The tenderer shall include for all appurtenances and appliances not particularly called for in this specification or on the contract drawings but which are necessary for the completion and satisfactory functioning of the system.

No claim for extra payment shall be accepted from the contractor for non-compliance with the above requirements.

If in the opinion of the tenderer there exists difference between the specification and the contract drawings, the tenderer shall clarify the difference with the engineer before tendering.

The Works to be installed under the contract shall comply with the Ministry of Public Works requirements for contract works under "GENERAL MECHANICAL SPECIFICATION".

CLIMATIC CONDITIONS

The following climatic conditions apply at the sites of the works and all materials and equipment used shall be suitable for these conditions:-

PARAMETERS	(**CONDITIONS)** **NAIROBI**
Maximum mean outdoor dry bulb Temperature, t_o	30˚C
Minimum Temperature	14.˚C
Relative Humidity	40% - 60%
Altitude	1915m ASL
Longitude	36° 21' 1.39"
Latitude	0° 46' 4.01" N
Max. solar radiation occurs during the month of February	

SYSTEMS DESIGN DATA

The air-conditioning systems are designed to maintain the following internal conditions with ambient conditions of 28ºC DB and 55% RH

Internal Temperature	23 ± 1ºC
Relative Humidity	50± 10%

The equipment described here under covers the specific requirements of equipment to be used for this contractor work and shall be used in conjunction with the accompanying contract drawings.

It shall be deemed that the tenderer has based his tender on plant and equipment which is equal in performance to that stated within the specification.

SPLIT AIR CONDITIONING SYSTEM

This shall be installed in the

The system shall be complete with;

Indoor wall mounted cooling unit (Evaporator)
Each coil unit shall consist of a cooling coil, air circulating fan, fan-guard and a thermostatic expansion valve. A timer unit shall be mounted in the control panel to both the de-frosting intervals and defrosting periods, both of which shall be variable.

The evaporator unit shall be of capacity as specified under the specified conditions, and shall be of the dry expansion type, and preferably of similar make as that of the condensing units. The unit shall be cassette type, high wall mounted or ceiling mounted as will be specified by the Engineer.

The coil shall be manufactured from seamless copper tubing with aluminium fins mechanically bonded to the tubes.

The panel shall be interlocked such, that on energizing the heater, the compressor, condenser and evaporator fan shall be de-energized and only re-energized when the heater is switched off by a evaporator mounted thermostat. A manual overriding switch shall by-pass the timer switch.

The air-circulating fan shall be manufactured from rigid aluminium sheet and finished in white casing. A drip tray with 25mm diameter connections shall be incorporated in the base of the casing.

The Unit shall be complete with the following:

- 1 No. air purifying filter.
- Built in drain pump to automatically drain water.
- Refrigeration pipe work with flared connections
- Fixing brackets/wall mounting kit/ground mounting kit
- Thermostat to control room temperature
- High and low pressure units
- Condensate discharge pipe work in Black PVC, 15mm diameter
- Service access valves
- Voltage Surge Protector

The system shall be suitable for 240V, 1 – Phase, 50Hz power supply

The split air-conditioning system shall be designed to maintain room inside temperature of 23±1º C and relative humidity of 50±10%.

Outdoor Units.
The outdoor units shall be installed and mounted on the wall using appropriate and approved mounting brackets. They shall be complete with hermetically sealed compressors. Safety devices shall include overload/surge protection among others.

The unit shall be connected to power provided by others. It shall also be connected to refrigerant piping and control wiring. It shall have adequate charge of refrigerator oil and R 407 refrigerant.

The air conditioning units shall be as York or approved equivalent and shall be provided with approved mounting brackets.

The Unit shall be complete with the following:

- Casing constructed of 18 gauge zinc coated mild steel, zinc phosphate bonderized, coated with oven baked polyester paint and weatherized for outdoor installation. It shall have weep holes on base to allow ease of drainage.
- Hermetically sealed compressor mounted to unit base with rubber isolated hold down bolts, uniform in oil & pressures and shall have internal overload protection.
- Refrigeration pipe work with flared connections
- Distributor with refrigeration control
- Fixing brackets/wall mounting kit/ceiling mounting kit
- Heat exchanger capacity controls
- Precise inverter frequency controls
- New oil returning system (refrigerant oil control system)
- High and low pressure units
- An innovation of installation with automatic address settings for indoor units with twin multiplex transmission system of no polarity.
- Condensate discharge pipe work
- Service access valves
- Voltage Surge Protector

Refrigeration Piping
Refrigerant pipe work shall be approved copper tubing and fittings, and shall be properly sized in conformity with the system manufacturer specifications. Pipework shall be joined together by soldering/brazing and shall be complete with all necessary joints, reducers and accessories.
The Ozone friendly refrigerant flow shall be controlled with either a capillary tube or thermostatic expansion valve. Installation shall be carried out by competent and qualified craftsmen. The Engineer may demand proof of qualifications and experience in installation of refrigeration systems.

Pipe work shall be tested for leaks after installation to the Engineers satisfaction. It shall be properly anchored, insulated and no vibration of pipes shall be allowed during the running of the systems. An electronic leak detector shall be used to test for leaks.

VARIABLE REFRIGERANT FLOW (VRF) SYSTEM

The VRF system shall be a dual aspect system (zone heating/cooling) with reduced energy & maintenance costs. The system shall be complete with flexible and user friendly central management system that will be integrated to building management system. The system shall be capable of more personalized & accurate calculations of energy consumption. The required capacity and the relating technical parameters for the indoor units shall be electronically relayed to the system management and outdoor unit.

Inverter Controlled Outdoor Unit

The three-way pipe outdoor units shall be installed and mounted on the 3rd floor sky garden using appropriate and approved anti-vibration mounting/base. They shall be complete with hermetically sealed compressors. Safety devices shall include overload/surge protection among others.

The air conditioning unit shall allow for maximum 48 indoor units of different capacity & types to be connected to a single refrigerant circuit. It shall have an outdoor unit capacity ratio of 50-130% with nominal cooling load as stated in the bill of quantities and capacity control in the range of 10 - 130% according to the indoor cooling load.

There shall be two outdoor units operating as duty and standby and connected to the same indoor units through control panel.

The Unit shall be complete with the following:

- Casing constructed of 18 gauge zinc coated mild steel, zinc phosphate bonderized, coated with oven baked polyester paint and weatherized for outdoor installation. It shall have weep holes on base to allow ease of drainage. . It shall have permanently attached base rails with 3-way forklift access and lifting holes.
- Hermetically sealed compressors mounted to unit base with rubber isolated hold down bolts, uniform in oil & pressures and shall have internal overload protection.
- Advanced compressor oil management system
- Compact flow selector unit
- TCC link: state-of-the-art communication bus system with automatically configured addressing and shall be Building management system (BMS) compatible.
- Heat exchanger capacity controls
- Precise inverter frequency controls with intelligent power drive unit (IPDU)
- New oil returning system (refrigerant oil control system)
- High and low pressure units

- An innovation of installation with automatic address settings for indoor units with twin multiplex transmission system of no polarity.
- Condensate discharge pipe work
- Service access valves
- Voltage Surge Protector

Indoor cooling unit (Evaporator)

Each coil unit shall consist of a cooling coil, air circulating fan, fan-guard and a thermostatic expansion valve. A timer unit shall be mounted in the control panel to both the de-frosting intervals and defrosting periods, both of which shall be variable.

The evaporator unit shall be of capacity as specified under the specified conditions, and shall be of the dry expansion type, and preferably of similar make as that of the condensing units. The unit shall be high static pressure ducted unit, cassette type, high wall mounted or ceiling mounted as will be specified by the Engineer.

The coil shall be manufactured from seamless copper tubing with aluminium fins mechanically bonded to the tubes.

The panel shall be interlocked such, that on energizing the heater, the compressor, condenser and evaporator fan shall be de-energized and only re-energized when the heater is switched off by a evaporator mounted thermostat. A manual overriding switch shall by-pass the timer switch.

The air-circulating fan shall be manufactured from rigid aluminium sheet and finished in white casing. A drip tray with 25mm diameter connections shall be incorporated in the base of the casing.

The Unit shall be complete with the following:

- 1 No. air purifying filter.
- Built-in drain pump to automatically drain water.
- Refrigeration pipe work with flared connections
- Fixing brackets/wall mounting kit/ground mounting kit
- Thermostat to control room temperature
- High and low pressure units
- Condensate discharge pipe work in Black PVC, 15mm diameter
- Service access valves
- Voltage Surge Protector
- Pulsed modulating valves (PMV) to permit linear variation of refrigerant flow in any circuit directly proportional to the thermal load.

The system shall be suitable for 240V, 1 – Phase, 50Hz power supply

Control Panel
Each system shall be provided for with a purpose made control panel fabricated from mild steel sheet of minimum SWG18 with a hinged door and then powder coated after manufacture. It shall be provided with an integral lock. It shall be complete with;

- ❖ Isolator
- ❖ Contactors
- ❖ Controlling thermostat with temp range from -10^0C to $+30^0$C
- ❖ 80mm dial thermometer with temp range from -10^0C to $+30^0$C
- ❖ Motor starters & current overload relays
- ❖ MCBs
- ❖ Phase failure relay with over and under voltage protection
- ❖ Timer switch for defrost control
- ❖ Push buttons for start and stop
- ❖ Audible and visual high temperature alarm with manual reset

The panel shall also have green light running indicators, red "door open" light and equipment circuit trip lights.

System Controls Unit
Controls Unit for each system shall incorporate complete controls to ensure continuous system services. Such controls shall include protection against any possible motor overload and over-heat, central control and monitoring for all the indoor units, individual temperature setting for each indoor unit, group control, set lock for each indoor unit and shall have self diagnosis function (display system errors).

The control unit shall control the duty and standby outdoor units to work alternately for twelve hours. This will be achieve by opening and closing of solenoid valves which will close or open the refrigerant pipes to achieve this operation.

The unit shall have a lock release to allow for control of the system by using wireless or wired remote control at the place where the indoor unit is installed. It shall also have a setup of a weekly and detailed schedule of the individual air conditioner.

The control unit shall have an open network controls designed for building management systems. It shall also have diagnostic software that will enable download of all operating parameters and instant analysis for commissioning and service.

The control system shall be complete with;

- Weekly timer for a 7 day timer complete with day omit
- Infrared wireless remote controller
- Remote temperature sensor for all indoor units
- Network/protocol adaptor kit to enable integration with artificial intelligence network
- External master on/off control board

- Error output control board
- Power peak cut control board
- Touch screen controller for full control of up to 64 indoor unit including electric billing
- Intelligent server and software package to allow connection to touch screen controller
- Energy monitoring interface

Testing and Commissioning Standards

The system shall be balanced to the satisfaction of the project engineer. It shall be run under complete automatic controls for 72 hours continuous operation to ascertain any faults in operation before acceptance and handover.

Any faults discovered during this time shall be corrected and a further test or tests of 72 hours duration shall be carried out to ensure satisfactory operation, all at the expenses of the contractor.

All accessories/equipment have to tested for capacity, efficiency, leakages and other human errors and shall meet standards and specifications.

As-Built-Drawings and maintenance manuals

Once the air conditioning system has been tested and commissioned, drawings and maintenance manuals shall be provided. They shall be a true and accurate representation of what has been commissioned.

Training

Adequate personnel shall be trained to perform normal operations and routine maintenance of the air conditioning system. The number of personnel to be trained shall be specified for particular pool.

TESTING & COMMISSIONING

All the pipe work and connections herein described shall be tested in the presence of the Engineer and to the hydraulic pressure the Engineer deems satisfactory and for a minimum period of 1 hour.

These tests must be before any insulation work is undertaken or any pipe work is finally enclosed in any ducts, etc. and due allowance is to be made in the tender for these tests.

The tenderer is to include for providing for all the testing equipment, temporary plugging and refilling etc.

ELECTRICAL WORKS

The tenderer shall include for supply, installation and commissioning of all starters, control apparatus, control panels and interconnecting wiring and conduits for equipment that the tenderer is supplying.
Power points shall be provided within 5 metres of the equipment installation point and the tenderer shall connect his equipment from this point.

BUILDERS WORKS

The tenderers shall allow for perforation of holes, hacking of walls etc. All disturbed surfaces shall thereafter be made good by the tenderer upon satisfactory completion of the works.

SECTION D:

BILLS OF QUANTITIES

AND

SCHEDULE OF UNIT RATES

BILLS OF QUANTITIES AND SCHEDULE OF UNIT RATES

CONTENTS

SPECIAL NOTES

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.

2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning and all taxes (**including 16% VAT**).

   In accordance with Government policy, the 16% VAT and 3% Withholding Tax **shall be deducted** from all payments made to the Tenderer, and the same shall be forwarded to the **Kenya Revenue Authority (KRA).**

3 All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part there of.

4. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere. Otherwise alternative brands of **equal** and **approved** quality will be accepted.

   Should the sub-contractor install any material not specified here in before receiving **written approva**l from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **Form of Tender for the tender to be deemed valid**.

6. Tenderers must enclose, together with their submitted tenders, detailed manufacturer's Brochures detailing Technical Literature and specifications on all the equipment they intend to offer.

1. Statement of Compliance

a) I confirm compliance of all clauses of the General Conditions, General Specifications and Particular Specifications in this tender.

b) I confirm I have not made and will not make any payment to any person, which can be perceived as an inducement to win this tender.

Signed: ……*for and on behalf of the Tenderer*

Date: ……..

Official Rubber Stamp: ……

BILLS No. 1

A) PRICING OF PRELIMINARIES ITEMS.

Prices will be inserted against item of preliminaries in the sub-contractor's Bills of Quantities and specification. These Bills are designated as Bill 1 in this Section. Where the sub-contractor fails to insert his price in any item he shall be deemed to have made adequate provision for this on various items in the Bills of Quantities. The preliminaries form part of this contract and together with other Bills of Quantities covers for the costs involved in complying with all the requirements for the proper execution of the whole of the works in the contract.

The Bills of Quantities are divided generally into three sections:-

a. Preliminaries – Bill 1

Sub-contractors preliminaries are as per those described in section C – sub-contractor preliminaries and conditions of contractor. The sub-contractor shall study the conditions and make provision to cover their cost in this Bill. The number of preliminary items to be priced by the Tenderer has been limited to tangible items such as site office, temporary works and others. However the Tenderer is free to include and price any other items he deems necessary taking into consideration conditions he is likely to encounter on site.

b. Installation Items – Other Bills

i. The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.
ii. The unit of measurements and observations are as per those described in clause 3.05 of the section

c. Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The sub-contract shall insert his totals and enter his grand total tender sum in the space provided below the summary.
This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document

BILL No. 1 PRELIMINARIES

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
1	Discrepancies clause 1.02					
2	Conditions of sub-contract Agreement clause 1.03					
3	Payments clause1.04					
4	Site location clause 1.06					
5	Scope of Contract Works clause 1.08					
6	Extent of the Contractor's Duties clause 1.09					
7	Firm price contract clause 1.12					
8	Variation clause 1.13					
9	Prime cost and provisional sum clause 1.14 (insert profit and attendance which is a percentage of expended PC or provisional sum.)					
10	Bond clause 1.15					
11	Government Legislation and Regulations clause 1.16					
12	Import Duty and Value Added Tax clause 1.17 (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)					
13	Insurance company Fees clause 1.18					
14	Provision of services by the Main contractor clause 1.19					
15	Samples and Materials Generally clause 1.21					
	SUB-TOTAL CARRIED TO PAGE D-6					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
16	Supplies clause 1.20					
17	Bills of Quantities clause 1.23					
18	Contractor's Office in Kenya clause 1.24					
19	Builder's Work clause 1.25					
20	Setting to work and Regulating system clause 1.29					
21	Identification of plant components clause 1.30					
22	Working Drawings clause 1.32					
23	Record Drawings (As Installed) and Instructions clause 1.33					
24	Maintenance Manual clause 1.34					
25	Hand over clause 1.35					
26	Painting clause 1.36					
27	Testing and Inspection – manufactured plant clause 1.38					
28	Testing and Inspection – Installation clause 1.39					
29	Storage of Materials clause 1.41					
30	Initial Maintenance clause 1.42					
31	Attendance Upon Tradesmen, etc. (Insert percentage only) clause 1.58					
32	Local and other Authorities notices and fees clause 1.60					
	SUB-TOTAL CARRIED TO PAGE D-6					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS	cts
33	Temporary Works clause 1.63					
34						
35	Patent Rights clause 1.64					
36	Mobilization and Demobilization Clause 1.65					
37	Extended Preliminaries Clause 1.66(see appendix on page C- 24)					
38	Amendment to Scope of Sub-contract Works Clause 1.68					
39	Contractor Obligation and Employers Obligation clause 1.69(see appendix page C- 24)					
	Any other preliminaries;					
	Subtotal above Subtotal brought forward from page D-4 Subtotal brought forward from page D-5					
	TOTAL FOR BILL NO. 1- PRELIMINARIEGS CARRIED FORWARD TO PRICE MAIN SUMMARY					

AIR CONDITIONING					
Item	**Description**	**Qty**	**Unit**	**Rate (Kshs.)**	**Amount (Kshs.)**
	VRF AC SYSTEM				
	Outdoor Unit				
A	1No. roof mounted inverter controlled outdoor unit connected to 5 Indoor units. It shall have a nominal cooling load of 40kW and capacity control in the range of 100 - 130% according to the indoor cooling load. The unit will operate with R410A refrigerant or any other non-ozone depleting refrigerant. It shall be provided with anchoring accessories including rawl bolts complete with anti-vibration rubber mountings. To be complete with a wall mounted simple controller to be mounted in the room and the control cable. The outdoor unit to be as Samsung DVM IV or approved equivalent.	1	No.		
	Indoor Units				
	Ceiling cassette units of direct expansion type with the following:- . A wired and wireless remote controller . A refrigerant (R410A) initial charge . Thermostat to control room temperature . Inbuilt condensate drain pump . 5m long insulated drain hose of 25mm diameter . Auto restart function . Sound pressure level of 35 db (A) The indoor units to be mounted in the walls on the position shown on the approved working drawings. The indoor unit to be as Samsung or approved equivalent.				
B	**Cooling capacity: 7.1 kW (24,000 Btu/hr)**	5	No.		
	Control Cable Installation Works				
C	Allow for wiring and conduit works including but not limited to interconnecting cable between the outdoor unit, indoor units, wired remote control and control system. The transmission cable to be CVV-SB 1.25mm^2 x 2C	150	Lm		
	Y-Branches				
D	Copper Y-branches complete with reducers and tees to connect indoor units from/to both gas and liquid main refrigerant pipe. The Y-branches to be as Toshiba RBM- series or approved equivalent.	10	No		
	Total Carried Forward to Collection Page for VRF System				

Item	Description	Qty	Unit	Rate (Kshs.)	Amount (Kshs.)
	Supply, deliver and instal copper tubing to BS 2871: part1 and capillary and compression fittings to BS 864: part 2. Tubing must be solid drawn round, clean, smooth and free from defects and from deleterious films in the bore. The fittings must be free from internal fins or other irregularities. Compression fittings shall be Type A (non-manipulative). Allow in pipework prices for pipe support, clips and cradles, bends, tees, insulation, branches, joining fixing and any other acessories for proper and satisfactory functioning of the system.				
	Copper Pipework and Insulation				
A	1 5/8 inch diameter insulated copper pipe	10	Lm		
B	1 3/8 inch diameter insulated copper pipe	5	Lm		
C	1 1/8 inch diameter insulated copper pipe	10	Lm		
D	7/8 inch diameter insulated copper pipe	35	Lm		
E	3/4 inch diameter insulated copper pipe	6	Lm		
F	5/8 inch diameter insulated copper pipe	20	Lm		
G	1/2 inch diameter insulated copper pipe	35	Lm		
H	3/8 inch diameter insulated copper pipe	30	Lm		
I	1/4 inch diameter insulated copper pipe	35	Lm		
	Bend				
J	1 5/8 inch diameter copper bend	5	No		
K	1 3/8 inch diameter copper bend	5	No		
L	1 1/8 inch diameter copper bend	8	No		
M	7/8 inch diameter copper bend	10	No		
N	3/4 inch diameter copper bend	14	No		
O	5/8 inch diameter copper bend	15	No		
P	1/2 inch diameter copper bend	16	No		
Q	3/8 inch diameter copper bend	10	No		
R	1/4 inch diameter copper bend	10	No		
	Total Carried Forward to Collection Page for VRF System				

Item	Description	Qty	Unit	Rate (Kshs.)	Amount (Kshs.)
	Shut off valves				
A	5/8 inch diameter shut off valve	3	Lm		
B	1/2 inch diameter ditto	3	Lm		
C	3/8 inch diameter ditto	5	Lm		
D	1/4 inch diameter ditto	5	Lm		
	PVC Drain Pipework Supply and instal uPVC pipes for drainage of the indoor units. The pipes are to B.S 5235 with fittings fixed as per the manufacturer's instructions and BS 5572. Tenderer must allow in their prices for all sizes of connectors, adapters, socket, reducers, holderbats, clips e.t.c. reqiured for the satisfactory running of the system.				
E	32mm diameter grey uPVC pipework	40	LM		
F	32mm diameter tee	10	No		
G	32mm diameter bend/elbow	10	No		
H	32mm diameter bend and U-trap	5	No		
	Electrical Works				
I	Allow for associated electrical works including but not limited to wiring from local isolators provided by others within one meter to all indoor units, outdoor units and control system. Allow for labelling all the circuits and equipment.	1	Item		
	Simple Central Controller Unit				
J	Central controller unit complete with operational switches shall be installed in the reception area or any other convinient place. The unit shall be capable of controlling upto 8 indoor units. The unit shall incorporate pilot lamps to enable operating conditions to be checked. The system casing shall be of mild steel and anodized and shall be complete with all other accessories necessary to automatic operations of the air conditioning system. The controls system functions shall be:- . Controlling indoor units . Individual operation and monitoring . Group Management . set lock/lock release for remote control of each indoor unit at place where its installed. . Schedule automatic operation management/energy saving . Self diagnosing function (display system errors) The controls system shall be complete with:- . Central control network interface unit (CNU) . 8No. product interface unit (PI485), . Independent built-in battery (minimum 2 hours)				
	Total Carried Forward to Collection Page for VRF System				

Item	Description	Qty	Unit	Rate (Kshs.)	Amount (Kshs.)
	. Ethernet (Cross UTP Cable) . 60 meters long 0.75mm^2 x 2C (shield) cable The controls system shall be Simple Central Controller Unit BMS compatible as manufactered by Samsung or equal and approved.	1	No.		
	Trunking				
A	75x50mm approved PVC trunking for concealing the refrigerant pipework.	50	LM		
	Associated Builder's Works				
B	Allow for associated builders works including drilling holes, chasing wall and floors and making good after installation.	1	Item		
	Labelling				
C	Allow for labelling for all the indoors and outdoors and their control to the satisfaction of the project engineer.	1	Item		
	As-installed Drawings				
D	Allow for as-installed drawing for all the air conditioning works and submitted to the project engineer in 3No. hard copies and soft copy in 1GB flash disk.	1	Item		
E	Ream white photocopying paper A/4 80g/m2	20	Ream		
F	HP Leserjet Print Cartridge serial 5A No. CE505A	5	No.		
	Total Carried Forward to Collection Page for VRF System				

COLLECTION PAGE VRF AC SYSTEM

Item	Description	Total Cost (Kshs.)
1	Total carried forward from page D-8 ……..	
2	Total carried forward from page D-9 ……..	
3	Total carried forward from page D-9 ……..	
4	Total carried forward from page D-10 ……..	
Total Cost for VRF AC System Carried to Air Conditioning Works Summary Page D-15		

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	SPLIT AC SYSTEM **SERVER ROOM AND DATA CENTRE** Supply , Installation, testing and commissioning, upon approval of working drawings, of the following items. NB: Outdoor units shall be mounted on external walls.				
A	The indoor unit shall be High Wall type air-cooling unit of capacity 7.1KW (24,000 Btu/hr). The air conditioning unit shall be supplied complete with room thermometer, room thermostat controls and remote control device. It shall charged with R410A refrigerant or any other non ozone depleting refrigerant. The unit shall be such that if the power supply goes off, it will start automatically after power is restored with three minute delay. The outdoor unit shall have matching capacity with the indoor unit. The unit shall be Samsung Model or equal and approved.	2	No.		
	Refrigeration Pipework				
B	Refrigeration liquid line pipework including 25mm Amaflex insulation.	20	LM		
C	Refrigeration gas line pipework including 25mm Amaflex insulation.	20	LM		
	Refrigerant				
D	Allow R410A refrigerant for charging air conditioning system.	1	Item		
	Drain				
E	25mm PVC condensate drainage pipework, class D, including bends, clips, joints and tees in the running lengths of the pipe.	15	LM		
	Surge Protector				
F	Power surge protector as Solatek to suite or equal and approved.	2	No.		
	Electrical Works				
G	Allow for associated electrical works from the local isolator provided by others within one meter to the air conditioning units and wiring from indoor unit to outdoor unit.	1	Item		
	Total Carried Forward to Collection Page for Split AC				

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs)
	Mounting Bracket				
A	Mounting bracket for the outdoor unit complete with a cage and provided with purpose-made protective steel iron angle frame and all other anchoring accessories including rawl bolts and anti-vibration rubber mountings to engineer's approval.	2	Item		
	Wall Mounted Wired Remote Controller				
B	Fully wired wall mounted remote controller panel, wiring and conduit works including but not limited to interconnecting cable between the outdoor and indoor units.	2	No.		
	Trunking				
C	75x50mm approved PVC trunking for concealing the refrigerant pipework.	10	LM		
	Total Carried Forward to Collection Page for Split AC				

COLLECTION PAGE FOR SPLIT AIR CONDITIONING

Item	Description	Total Cost (Kshs.)
1	Total carried forward from page D-12 ……	
2	Total carried forward from page D-13 ……	
Total Cost for Split AC System Carried to Air Conditioning Works Summary Page D-15		

SUMMARY PAGE FOR AIRCONDITIONING WORKS

Item	Description	Total Cost (Kshs.)
1	Total carried forward from VRF System collection page D-11 ……	
2	Total carried forward from Split System collection page D-14 ……	
Total Cost for Air Conditioning Works Carried to Main Summary Page D-16		

MAIN SUMMARY PAGE		
Item	**Description**	**Total Cost (Kshs)**
1	Total for Preliminaries and General Items ……	
2	Total Carried Forward from Collection Page for Air Conditioning Works …….Page D - 15 ……	
3	Contingency Sum to be used at the discretion of the Project Engineer. ……	350,000
Total Cost for Air Conditioning works Carried to Grand Summary in Vol. 1 of 4		

SECTION E:

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

CONTENTS

TECHNICAL SCHEDULE

1. General Notes to the Tenderer

1.1 The tenderer shall submit technical schedules for all materials and equipment upon which he has based his tender sum.

1.2 The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings described in the technical schedules. Manufacturer's literature shall be accepted. Failure to comply with this may have his tender disqualified.

1.3 Completion of the technical schedule shall not relieve the Contractor from complying with the requirements of the specifications except as may be approved by the Engineer.

TECHNICAL SCHEDULE

The tenderer must complete in full the technical schedule. Apart from the information required in the technical schedule, the tenderer **MUST SUBMIT** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule (fill forms attached).

ITEM	DESCRIPTION	MANUFACTURER	COUNTRY OF ORIGIN	REMARKS (Catalogue No. etc.)
A	Split Air Conditioning (S.A.C) System			
B	Refrigerant (for S.A.C)			
C	VRF. Air Conditioning (V.A.C) System (Outdoor unit)			
D	VRF. Air Conditioning (V.A.C) System (Indoor units)			
E	Refrigerant (for V.A.C)			
F	Simple Central Controller Unit			

Catalogue must be attached for all the items in the schedule of material above

SECTION F:

DRAWING SCHEDULE

CONTENTS

DRAWING SCHEDULE:

As shall be provided during project implementation.

SECTION G:

STANDARD FORMS

STANDARD FORMS

CONTENTS

NOTE: **ALL FORMS IN THIS SECTION MUST BE FILLED AS THEY SHALL BE PART OF THE EVALUATION CRITERIA**

KEY PERSONNEL

Qualifications and experience of key personnel proposed for administration and execution of the Contract.

POSITION	NAME	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

I certify that the above information is correct.

…….. …….. ……. ……..……

Title Signature Date

CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS

Work performed on works of a similar nature and volume over the last five years.

PROJECT NAME	NAME OF CLIENT	TYPE OF WORK AND YEAR OF COMPLETION	VALUE OF CONTRACT (Kshs.)

I certify that the above works were successfully carried out and completed by ourselves.

…… …… ……..

Title Signature Date

SCHEDULE OF ON-GOING PROJECTS

Details of on-going or committed projects, including expected completion date.

PROJECT NAME	NAME OF CLIENT	CONTRACT SUM	% COMPLETE	COMPLETION DATE

I certify that the above works are currently being carried out by ourselves.

……. ……..…… …….

Title Signature Date

DETAILS OF LITIGATIONS OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER IS INVOLVED AS ONE OF THE PARTIES

1. ._____.
2. ._____
3. ._____.
4. ._____.
5. ._____.
6. ._____.
7. ._____.
8. ._____.
9. ._____.
10 ._____.

SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR CARRYING OUT THE WORKS

ITEM OF EQUIPMENT	DESCRIPTION, MAKE AND AGE (Years)	CONDITION (New, good, poor) and number available	OWNED, LEASED (From whom?), or to be purchased (From whom?)