



KENYA DAIRY BOARD

**PROPOSED ERECTION AND COMPLETION OF THE KENYA DAIRY BOARD ADMINISTRATION
BLOCK AT UPPER KABETE**

TENDER NO: KDB/W/400/1/2021

W.P ITEM NO. D116/CE/KMB/2001-JOB NO.10126C

VOLUME 4

**TENDER SPECIFICATIONS AND BILLS OF QUANTITIES FOR
ELECTRICAL INSTALLATION WORKS**

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DEFINITIONS

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

The Employer	KENYA DAIRY BOARD
Employer's representative	The Managing Director, Kenya Dairy Board, P.O BOX 30406-00100, NAIROBI.
Project Manager	The Works Secretary State Department for Public Works P.O. Box 30743 – 00100 Nairobi
Architect	Chief Architect State Department for Public Works P. O. Box 30743 – 00100 Nairobi
Electrical Engineer	Chief Engineer (Electrical) State Department for Public Works P. O. Box 41191 – 00100 Nairobi
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Quantity Surveyor	Chief Quantity Surveyor State Department for Public Works P. O. Box 30743 – 00100 Nairobi
Structural Engineer	Chief Engineer (Structural) State Department for Public Works P. O. Box 30743 – 00100 Nairobi
Contractor	The firm appointed to carry out Builders Works.
Sub-contractor	The firm appointed to carry out Supply, delivery, and Installation of Electrical Works.
The Site	The Site is Located at Upper Kabete, Nairobi County

SECTION A

INSTRUCTIONS TO TENDERERS

INSTRUCTIONS TO TENDERERS

CONTENTS

DESCRIPTION

Contents Elect/A-1

Tender Evaluation CriteriaElect/A-2 – Elect/A-6

Note.

This criterion shall be used to evaluate the bidders proposed to carry out the specialized works who shall be domestic subcontractors to the main bidder on award of the contract.

TENDER EVALUATION CRITERIA

After tender opening, the tenders will be evaluated in 2 stages, namely:

1. Preliminary Evaluation;
2. Technical Evaluation;

Note: This criterion shall be used to evaluate sub contracts

STAGE 1: PRELIMINARY EVALUATION

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

These conditions shall include the following:

- i) Company Certificate of incorporation/registration;
- ii) Current certificate of Registration with National Construction Authority (NCA 5 and above) in Electrical Installation Works
- iii) Current Annual NCA contractor's Practicing License;
- iv) Current Class of Licenses with the Energy and Petroleum Regulatory Authority (formerly ERC) ERC B and above.
- v) Valid Tax Compliance Certificate;
- vi) Compliance with Technical Specifications

Note

On compliance with Technical Specifications, bidders shall supply equipment/items which comply with the technical specifications set out in the bid document. In this regard, the bidders will be required to submit relevant technical brochures/catalogues with the tender document, highlighting (using a mark-pen or highlighter) the Catalogue Number/model of the proposed items. Such brochures/catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:

- (i) Standards of manufacture;
- (ii) Performance ratings/characteristics;
- (iii) Material of manufacture;
- (iv) Electrical power ratings; and
- (v) All other requirements as indicated in the technical specifications of the bid.

The bid will then be analyzed, using the information in the technical brochures, to determine compliance with technical specifications for the works/items as indicated in the tender document. Bidders not complying with any of the technical specifications shall be adjudged to be technically non-responsive while those meeting all the technical specifications shall be adjudged to be technically responsive.

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

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

STAGE 2: TECHNICAL EVALUATION

The tenderers will be required to provide evidence in satisfying the employer of their eligibility, their capability and adequacy to effectively carry out these works.

In order to comply with this requirement the tenderers shall be required to fill the Standard Forms provided in the bid document for the purposes of providing the required information. The tenderers may also attach the required information if they so desire;

The award of points considered in this section shall be as shown below:

<u>PARAMETER</u>	<u>MAXIMUM POINTS</u>
(i) Key personnel -----	12
(ii) Contract Completed in the last Five (5) years -----	9
(iii) Schedules of on-going projects -----	4
(iv) Schedules of contractor's equipment -----	12
(v) Litigation History -----	2
TOTAL	<u>39points</u>

The pass-mark under the Technical Evaluation is 28 points.

The detailed scoring plan shall be as shown in table 1.

TABLE 1: Technical Evaluation

Item	Description	Points Scored	Max. Point	
1	Key Personnel (Attach evidence)			12
	Director of the firm <ul style="list-style-type: none"> ✓ Holder of degree in relevant Engineering field-----4 ✓ Holder of diploma in relevant Engineering field -----3 ✓ Holder of certificate in relevant Engineering field -----2 ✓ Holder of trade test certificate in relevant Engineering field ----1 ✓ No relevant certificate-----0 		4	
	At least 1No. degree/diploma holder of key personnel in relevant field <ul style="list-style-type: none"> ✓ With over 10 years relevant experience----- 4 ✓ With over 5 years relevant experience -----2 ✓ With under 5 years relevant experience -----1 		4	
	At least 1No certificate holder of key personnel in relevant field <ul style="list-style-type: none"> ✓ With over 10 years relevant experience----- 2 ✓ With over 5 years relevant experience -----1 ✓ With under 5 years relevant experience -----0.5 		2	
2	At least 2No artisan (trade test certificate in relevant field) <ul style="list-style-type: none"> ✓ Artisan with over 10 years relevant experience -----2 ✓ Artisan with under 10 years relevant experience -----1 ✓ Non skilled worker with over 10 years relevant experience ---0 		2	
	Contracts completed in the last five (5) years (Max of 3No. Projects)- Provide Evidence <ul style="list-style-type: none"> ✓ Project of similar nature, complexity or magnitude -----3 ✓ Project of similar nature but of lower value than the one in consideration -----2 ✓ No completed project of similar nature -----0 		9	
3	On-going projects – Provide Evidence <ul style="list-style-type: none"> ✓ No Project of similar nature, complexity and magnitude ----- 4 ✓ Three and below Projects of similar, nature complexity and magnitude -----3 ✓ Four and above Projects of similar nature, complexity and magnitude ----- 2 		4	
4	Schedule of contractors equipment and transport (proof or evidence of ownership/Lease)			12
	a)Relevant Transport <ul style="list-style-type: none"> ✓ Means of transport (Vehicle)----- 6 ✓ No means of transport----- 0 		6	
	b) Relevant Equipment <ul style="list-style-type: none"> ✓ Has relevant equipment for work being tendered -----6 ✓ No relevant equipment for work being tendered----- 0 		6	
5	Litigation History <ul style="list-style-type: none"> ✓ Duly Filled -----2 ✓ Not filled -----0 		2	
	TOTAL			39

Any bidder who scores 28 points and above shall be considered for further evaluation.

SECTION B

GENERAL SPECIFICATIONS

OF

MATERIALS AND WORKS

PART 1. GENERAL SPECIFICATIONS OF WORKS

- 1.1 General
- 1.2 Standard of Materials
- 1.3 Workmanship
- 1.4 Procurement of Materials
- 1.5 Shop Drawings
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PART 2. GENERAL SPECIFICATIONS OF ELECTRICAL WORKS

- 2.1 Position of Electrical Plant and Apparatus
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- 2.19 Lighting Switches
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- 2.22 Cooker Outlets
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- 2.25 LED Lamps
- 2.26 lighting Fittings Street lighting Lanterns
- 2.27 Position of Points and Switches
- 2.28 Street/Security Lighting Columns
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- 2.30 Wiring System for Street Lighting
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- 2.32 Current Operated Earth leakage circuit breaker
- 2.33 MV Switchboard
- 2.34 Steel Conduits and Steel Trunking
- 2.35 Testing on Site
- 2.36 Solar panel
- 2.37 Inverter
- 2.38 Batteries

PART 1. GENERAL SPECIFICATIONS OF WORKS

1.1 GENERAL

This specification is to be read in conjunction with the drawings which are issued with it. Bills of quantities shall be the basis of all additions and omissions during the progress of the works.

1.2 STANDARD OF MATERIALS

Where the material and equipment are specifically described and named in the Specification followed by approved equal, they are so named or described for the purpose of establishing a standard to which the sub-contractor shall adhere.

Should the Sub-contractor install any material not specified herein before receiving approval from the proper authorities, the Engineer shall direct the Sub-contractor to remove the material in question immediately. The fact that this material has been installed shall have no bearing or influence on the decision by the Engineer.

All materials condemned by the Engineer as not approved for use, are to be removed from the premises and suitable materials delivered and installed in their place at the expense of the Sub- contractor. All materials required for the works shall be new and the best of the respective kind and shall be of a uniform pattern.

1.3 WORKMANSHIP

The workmanship and method of installation shall conform to the best standard practice. All work shall be performed by a skilled tradesman and to the satisfaction of the Engineer. Helpers shall have qualified supervision.

Any work that does not in the opinion of the Engineer conform to the best standard practice will be removed and reinstated at the Sub-contractors expense.

Permits, Certificates or Licenses must be held by all tradesmen for the type of work; in which they are involved where such permits, certificates or licenses exist under Government legislation.

1.4 PROCUREMENT OF MATERIALS

The sub-contractor is advised that no assistance can be given in the procurement or allotment of any materials or products to be used in and necessary for the construction and completion of the work.

Sub-contractors are warned that they must make their own arrangements for the supply of materials and/or products specified or required.

1.5 SHOP DRAWINGS

Before manufacture or Fabrication is commenced the sub-contractor shall submit Two copies of detailed drawings of all control pillars, meter cubicles, medium voltage switchboards including their components showing all pertinent information including sizes, capacities, construction details, etc, as may be required to determine the suitability of the equipment for the approval of the Engineer.

Approval of the detailed drawings shall not relieve the sub-contractor of the full responsibility of errors or the necessity of checking the drawings himself or of furnishing the materials and equipment and performing the work required by the plans and specifications.

1.6 RECORD DRAWINGS

These diagrams and drawings shall show the completed installation including sizes, runs and arrangements of the installation. The drawings shall be to scale not less than 1:50 and shall include plan views and section.

The drawings shall include all the details which may be useful in the operation, maintenance or subsequent modifications or extensions to the installation.

Three sets of diagrams and drawings shall be provided, all to the approval of the Engineer.

One coloured set of line diagrams relating to operating and maintenance instructions shall be framed and, mounted in a suitable location.

1.7 REGULATIONS AND STANDARDS

All work executed by the Sub-contractor shall comply with the current edition of the “Regulations” for the Electrical Equipment of Buildings, issued by the Institution of Electrical Engineers, and with the Regulations of the Local Electricity Authority.

Where the two sets of regulations appear to conflict, they shall be clarified with the Engineers. All materials used shall comply with relevant Kenya Bureau of Standards Specification.

1.8 SETTING OUT WORK

The sub-contractor at his own expenses; is to set out works and take all measurements and dimensions required for the erection of his materials on site; making any modifications in details as may be found necessary during the progress of the works, submitting any such modifications or alterations in detail to the Engineer before proceeding and must allow in his Tender for all such modifications and for the provision of any such sketches or drawings related thereto.

PART 2. GENERAL SPECIFICATIONS OF ELECTRICAL WORKS

2.1 POSITIONS OF ELECTRICAL PLANT AND APPARATUS

The routes of cables and approximate positions of switchboards etc, as shown on the drawings shall be assumed to be correct for purpose of Tendering, but exact positions of all electrical Equipment and routes of cables must be agreed on site with the Engineer before any work is carried out.

2.2 MCB DISTRIBUTION PANELS AND CONSUMER UNITS

All cases of MCB Panels and consumer units shall be constructed in heavy gauge sheet with hinged covers.

Removable undrilled gland plates shall be provided on the top and bottom of the cases. Miniature circuit breakers shall be enclosed in moulded plastic with the tripping mechanism and arc chambers separated and sealed from the cable terminals.

The operating dolly shall be tripfree with a positive movement in both make and break position. Clear indication of the position of the handle shall be incorporated.

The tripping mechanism shall be on inverse characteristic to prevent tripping in temporary overloads and shall not be affected by normal variation in ambient temperature.

A locking plate shall be provided for each size of breaker; A complete list of circuit details on typed cartridge paper glued to stiff cardboards and covered with a sheet of perspex, and held in position with four suitable fixings, shall be fitted to the inner face of the lids of each distribution panel. The appropriate MCB ratings shall be stated on the circuit chart against each circuit in use: Ivorine labels shall be secured to the insulation barriers in such a manner as to indicate the number of the circuits shown on the circuit chart.

Insulated barriers shall be fitted between phases, and neutrals in all boards, and to shroud live parts.

Neutral cables shall be connected to the neutral bar in the same sequence as the phase cables are connected to the MCB's. This shall also apply to earth bars when installed.

2.3 FUSED SWITCHGEAR AND ISOLATORS

All fused switchgear and isolators whether mounted on machinery, walls or industrial panels shall conform to the requirements of KS 04 – 226 PART: 1: 1985.

All contacts are to be fully shrouded and are to have a breaking capacity on manual operations as required by KS 04 – 182: 1980.

Fuse links for fused switches are to be of high rupturing capacity cartridge type, conforming to KS 04 – 183: 1978.

Isolators shall be load breaking/fault making isolators.

Fused switches and isolators are to have separate metal enclosures. Mechanical interlocks are to be provided between the door and main switch operating mechanism so arranged that the door may not be opened with the switch in the 'ON' position. Similarly; it shall not be possible to close the switch with the door open except that provision to defeat the mechanical interlock and close the switch with the door in the open position for test purposes. The 'ON' and 'OFF' positions of all switches and isolators shall be clearly indicated by a mechanical flag indicator or similar device. In T.P & N fused switch units, bolted neutral links are to be fitted.

2.4 CONDUITS AND CONDUIT RUNS

Conduit systems are to be installed so as to allow the loop-in system of wiring:

All conduits shall be black rigid super high impact heavy gauge class 'A' PVC in accordance with KS 04 – 179: 1988 and IEE Regulations. No conduit less than 20mm in diameter shall be used anywhere in this installation.

Conduit shall be installed buried in plaster work and floor screed except when run on wooden or metal surface when they will be installed surface supported with saddles every 600mm. Conduit run in chases shall be firmly held in position by means of substantial pipe hooks driven into wooden plugs.

The Sub-contractor's attention is drawn to the necessity of keeping all conduits entirely separate from other piping services such as water and no circuit connections will be permitted between conduits and such pipes.

All conduits systems shall be arranged wherever possible to be self-draining to switch boxes and conduit outlet points for fittings:

The systems, when installed and before wiring shall be kept plugged with well fitting plugs and when short conduit pieces are used as plugs, they shall be doubled over and tied firmly together with steel wire; before wiring all conduit systems shall be carried out until the particular section of the conduit installation is complete in every respect.

The sets and bends in conduit runs are to be formed on site using appropriate size bending springs and all radii of bends must not be less than 2.5 times the outside diameter of the conduit. No solid or inspection bends, tees or elbows will be used.

Conduit connections shall either be by a demountable (screwed up) assembly or adhesive fixed and water tight by solution. The tube and fittings must be clean and free of all grease before applying the adhesive. When connections are made between the conduit and switch boxes, circular or non- screwed boxes, care shall be taken that no rough edges of conduit stick out into the boxes.

Runs between draw in boxes are not to have more than two right angle bends or their equivalent. The sub-contractor may be required to demonstrate to the Engineers that wiring in any particular run is easily withdrawable and the sub-contractor may, at no extra cost to the contract; be required to install additional draw-in boxes required. If conduit is installed in straight runs in excess of 6000mm, expansion couplings as manufactured by Egatube shall be used at intervals of 6000mm.

Where conduit runs are to be concealed in pillars and beams, the approval of the Structural Engineer, shall be obtained. The sub-contractor shall be responsible for marking the accurate position of all holes chases etc., on site, or if the Engineer so directs, shall provide the Main Contractor with dimensional drawings to enable him to mark out and form all holes and chases. Should the sub- contractor fail to inform the main contractor of any inaccuracies in this respect they shall be rectified at the sub-contractors expense.

It will be the Sub-contractors responsibility to ascertain from site, the details of reinforced concrete or structural steelwork and check from the builder's drawings the positions of walls, structural concrete and finishes. No reinforced concrete or steelwork may be drilled without first obtaining the written permission of the Structural Engineer.

The drawings provided with these specifications indicate the appropriate positions only of points and switches, and it shall be the Sub-Contractors responsibility to mark out and centre on site the accurate positions where necessary in consultation with the Architect and the Engineer. The sub-contractor alone shall be responsible for the accuracy of the final position.

2.5 CONDUIT BOXES AND ACCESSORIES

All conduit outlets and junction boxes are to be either malleable iron and of standard circular pattern of the appropriate type to suit saddles being used or super high impact PVC manufactured to KS 04 – 179 : 1983.

Small circular pattern boxes are to be used with conduits up to and including 25mm outside diameter. Rectangular pattern adaptable boxes are to be used for conduits of 32mm outside diameter and larger. For drawing in of cables in exposed runs of conduit, standard pattern through boxes are to be used:

Boxes are to be not less than 50mm deep and of such dimensions as will enable the largest appropriate number of cables for the conduit sizes to be drawn in without excessive bending.

Outlet boxes for lighting fittings are to be of the loop-in type where conduit installation is concealed and the sub-contractor shall allow one such box per fitting, except where fluorescent fittings are specified when two such boxes per fitting shall be fitted flush with ceiling and if necessary fitted with break joint rings. Pattresses shall be fitted where required to outlets on surface conduit runs.

Adaptable boxes are to be of PVC or mild steel (of not less than 12swg) and black enamelled or galvanised finish according to location. They shall be of square or oblong shape location. They shall be of square or oblong shape complete with lids secured by four 2 BA brass roundhead screws; No adaptable box shall be less than 75mm x 75mm x 50mm or larger than 300mm x 300mm x 75mm and shall be adequate in depth in relation to the size of conduit entering it. Conduits shall only enter boxes by means of conduit bushes.

2.6 LABELS

Labels fitted to switches and fuse boards; -

- (i) Shall be Ivorine engraved black on white.
- (ii) Shall be secured by R.H brass screws of same manufacturing throughout.
- (iii) Shall be indicated on switches: -
 - a) Reference number of switches
 - b) Special current rating
 - c) Item of equipment controlled
- (iv) Shall indicate on MCB panels
 - d) Reference number
 - e) Type of board, i.e., lighting, sockets, etc.,
 - f) Size of cable supplying panel
 - g) where to isolate feeder cable
- (v) Shall be generally not less than 75mm x 50mm.

2.7 EARTHING

The earthing of the installation shall comply with the following requirements;-

- (i) It shall be carried out in accordance with the appropriate sections of the current edition of the Regulations, for the Electrical Equipment of Buildings issued by Institute of Electrical Engineers of Great Britain.

- (ii) At all main distribution panels and main service positions a 25mm x 3mm minimum cross-sectional area Copper tape shall be provided and all equipment including the lead sheath and armouring of cables, distribution boards and metal frames shall be bonded thereto.
- (iii) The earth tape in Sub-clause (ii) shall be connected by means of a copper tape or cable of suitable cross-sectional area to an earth electrode which shall be a copper earth rod (see later sub-clause).
- (iv) All tapes to be soft high conductivity copper, untinned except where otherwise specified and where run underground on or through walls, floors, etc., it shall be served with corrosion resisting tape or coated with corrosion compound and braided
- (v) Where the earth electrode is located outside the building a removable test link shall be provided inside the building as near as possible to the point of entry to the tape, for isolating the earth electrode for testing purposes.
- (vi) Earthing of sub-main equipment shall be deemed to be satisfactory where the sub- main cables are M.I.C.S. or conduit with separate earth wire, and installation is carried out in accordance with the figures stated in the current edition of the I.E.E Regulations.
- (vii) Where an earth rod is specified (see Sub-clause (iii) it shall be proprietary manufacture, solid hand drawn copper of 15mm diameter driven into the ground to a minimum depth of 3.6M. It shall be made up to 1.2m sections with internal screw and socket joints and fitted with hardened steel tip and driving cap.
- (viii) Earth plates will not be permitted
- (ix) Where an earth rod is used the earth resistance shall be tested in the manner described in the current edition of the IEE Regulations, by the Sub-Contractor in the presence of the Engineer and the Sub-Contractor shall be responsible for the supply of all test equipment.
- (x) Where copper tape is fixed to the building structure it shall be by means of purpose made non-ferrous saddles which space the conductor away from the structure a minimum distance of 20mm. Fixings, shall be made using purpose made plugs; No fixings requiring holes to be drilled through the tape will be accepted.
- (xi) Joints in copper tape shall be tinned before assembly riveted with a minimum of two copper rivets and seated solid.
- (xii) Where holes are drilled in the earth tape for connection to items of equipment the effective cross sectional area must not be less than required to comply with the IEE regulations.
- (xiii) Bolts, nuts and washers for any fixing to the earth tape must be of non-ferrous material.
- (xiv) Attention is drawn to the need for the earthing metal parts of lighting fittings and for bonding ball joint suspension in lighting fittings.

2.8 CABLES AND FLEXIBLE CORDS

All cables used in this Sub-Contract shall be manufactured in accordance with the current appropriate Kenya standard Specification which are as follows: -

P.V.C. Insulated Cables and Flexible Cords	---	Ks 04-192:1988
P.V.C Insulated Armoured Cables	---	Ks 04-194:1990
Armouring of Electric cables	---	Ks 04-290:1987

The successful Sub-Contractor will, at the Engineers discretion be required to submit samples of cables for the Engineers approval; the Engineer reserves the right to call for the cables of an alternative manufacture without any extra cost being incurred.

P.V.C. insulated cables shall be 500/1000 volt grade. No cables smaller than 1.5mm² shall be used unless otherwise specified. The installation and the finish of cables shall be as detailed in later clauses. The colour of cables shall conform to the details stated in the "Cable Braid and insulation Colours" Clause.

2.9 ARMoured P.V.C. INSULATED AND SHEATHED CABLES:

Shall be 600/1000-volt grade manufactured to Ks 04-194:1988 and Ks 04-187/188 with copper stranded conductors.

The wire armour of the cable shall be used wholly as an earth continuity conductor and the resistance of the wire armour shall have a resistance not more than twice of the largest current carrying conductor of the cable.

P.V.C./S.W.A./P.V.C. cables shall be terminated using "Telecom" "B" type or approved equal or approved equal glands and a P.V.C. tapered sleeve shall be provided to shroud each gland.

2.10 CABLE SUPPORTS, MARKERS AND TILES

All PVC/SWA/PVC cables run inside the building shall be fixed in rising ducts or on ceilings by means of die cast cable hooks or clamps, of appropriate size to suit cables, fixed by studs and back nuts to their channel sections.

Alternatively, fixing shall be by BICC claw type cleating system with die-cast cleats and galvanized mild steel back straps or similar approved equal method. For one or two cables run together the cleats shall be fixed a special channel section supports or backstraps described above which shall in turn be secured to walls or ceilings of ducts by rawbolts.

In excessively damp or corrosive atmospheric conditions special finishes may be required and the Sub-contractor shall apply to the Engineer for further instructions before ordering cleats and channels for such areas.

The above type of hooks and clamps and channels or cleats and blackstraps shall also be used for securing cables in vertical ducts.

Cables supports shall be fixed at 600mm maximum intervals, the supports being supplied and erected under this Sub-contract. Saddles shall not be used for supporting cables nor any other type of fixing other than one of the two methods described above or other system which has received prior approval of the Engineer;

Cables are to be kept clear of all pipe work and the Sub-contractor shall work in close liaison with other services Sub-contractors.

The Sub-Contractor shall include for the provision of fixing of approved type coloured slip on cables end markers to indicate permanently the correct phase and neutral colours on all ends.

Provision shall be made for supplying and fixing approved non-corrosive metal cable markers to be attached to the outside of all PVC/SWA/PVC cables at 15mm intervals indicating cable size and distinction.

Where PVC/SWA/PVC cables are outside the building they shall be laid underground 750mm deep with protecting concrete interlocking cover tiles laid over which shall be provided and laid under this Sub-contract.

All necessary excavations and reinstatement of ground including sanding or trenches will be carried out by the Sub-Contractor, unless otherwise stated.

2.11 PVC INSULATED CABLES

Shall be of non-braided type as CMA reference 6491 x 600/1000/1000 volt grade cables, or equal approved.

PVC cables shall conform to the details of the “Cables and Flexible cords” and “Cable Braid and Insulation Colours” clauses.

2.12 HEAT RESISTING CABLES

Final connections to cookers, water heaters, etc., shall be made using butyl rubber insulated cable as CMA reference 610 butyl (Single core 600/1000 Volt).

This type of cable shall be used in all instances where a temperature exceeding 100°F, but not exceeding 150°F is likely to be experienced. Final connections to all lighting fittings (and other equipment where a temperature in excess of 150°C likely to be experienced) shall be made using silicon rubber insulated cable or equal and approved.

2.13 FLEXIBLE CORDS

Shall be in accordance with the “Cable and Flexible Cords” clause. No cord shall be less than 24/0.2mm in size unless otherwise specified.

Circular white twin TRS flex shall be used for plain pendant fittings up to 100 watts. For all other types of lighting fittings the flexible cable shall be silicone rubber insulated.

No polythene insulated flexible cable shall be used in any lighting fitting or other appliance (see “Heat Resisting Cables” Clause 30).

2.14 CABLE ENDS AND PHASE COLOURS

All cable ends connected up in switchgear, MCB panels etc., shall have the insulation carefully cut back and the ends sealed with Hellerman rubber slip on cable end markers.

The markers shall be of appropriate phase colour for switch and all other live feeds to the details of the "Cable Insulation Colours" clause. Black cable with black end markers shall only be used for neutral cables.

2.15 CABLE INSULATION COLOURS

Unless otherwise stated in later clauses the insulation colours shall be in accordance with the following table.

Where other systems are installed the cable colours shall be in accordance with the details stated in the appropriate clause.

<u>SYSTEM</u>	<u>INSULATION COLOUR</u>	<u>CABLE END MARKER</u>
1) Main and Sub-Main		
a) Phase	Red	Red
b) Neutral	Black	Black
2) Sub-Circuits Single Phase		
a) Phase	Red	Red
b) Neutral	Black	Black

2.16 SUB-CIRCUIT WIRING

For all lighting and sockets wiring shall be carried out in the "looping in" system and there shall be no joints whatsoever. No lighting circuits shall comprise more than 20 points when protected by 10A MCB. Cables with different cross-section area of copper shall not be used in combination.

Lighting circuits P.V.C. cable.

- (i) 1.5mm² for all lighting circuits indicated on the drawing.

Power circuits P.V.C cable (minimum sizes).

- (i) 2.5mm² for one, two or three 5Amp sockets wired in parallel.
- (ii) 2.5mm² for one 15Amp socket.
- (iii) 2.5mm² for maximum of ten switched 13 Amp sockets wired from 30 Amp MCB.

The wiring sizes for lighting circuits and sockets are shown on the drawings. In such cases, the sizes shown on the drawings shall prevail over the sizes specified.

Wiring sizes for other appliances shall be shown on the drawing or specified in later clauses of this specification.

2.17 SPACE FACTOR

The maximum number of cables that may be accommodated in a given size of conduit or trunking or duct is not to exceed the number in Tables B.5 and B.6 or as stated in Regulation B.91, B.117 and B.118 of the I.E.E Regulations whichever is appropriate.

2.18 INSULATION

The insulation resistance to earth and between poles of the whole wiring system, fittings and lumps, shall not be less than the requirements of the latest edition of the I.E.E Regulations. Complete tests shall be made on all circuits by the Sub-contractor before the installations are handed over.

A report of all tests shall be furnished by the Sub-Contractor to the Engineer. The Engineer will then check test with his own instruments if necessary.

2.19 LIGHTING SWITCHES

These shall be mounted flush with the walls, shall be contained in steel or alloy boxes and shall be of the gangs' ratings and type shown in the drawings. They shall be as manufactured by M.K. Electrical Ltd., or other equal and approved to KS 04 – 247: 1988

2.20 SOCKETS AND SWITCHED SOCKETS

These shall be flush pattern in steel/pvc box and shall be of the gangs and type specified in the drawings.

They shall be 13- Amp, 3-pin, shuttered, switched and as manufactured by "M.K. Electrical Co. Ltd.", or other approved equal to KS 04 – 246: 1987

2.21 FUSED SPUR BOXES

These shall be flush, D.P switched as in steel/pvc box and of type and make specified in the drawings complete with pilot light and as manufactured by "M. K. Electrical Company Ltd", or other approved equal. KS 04 – 247: 1988

2.22 COOKER OUTLETS

These shall be flush mounted with 13-A switched socket outlet and neon indicator Lamps.

The cooker control units shall be as manufactured by "M.K. Electrical Company Ltd", or other approved equal KS 04 – 247: 1988

2.23 CONNECTORS

Shall be specified in the drawings and appropriate rating. These shall be fitted at all conduit box lighting point outlets for jointing of looped P.V.C cables with flexible cables of specified quality.

2.24 LAMPHOLDERS

Shall be of extra heavy H.O skirted and shall be provided for every specified lighting fitting and shall be B.C., E.S., or G.E.S as required. All E.S. and G.E.S. holders shall be heavy brass type (except for plain pendants where the reinforced bakelite type shall be used). The screwed cap of the E.S and G.E.S. holders shall be connected to the neutral.

Where lampholders are supported by flexible cable, the holders shall have “cord grip” arrangements and in the case of metal shades earthing screws shall be provided on each of the holders.

The Sub-Contractor must order the appropriate type of holder when ordering lighting fittings, to ensure that the correct types of holders are provided irrespective of the type normally supplied by the manufacturers.

2.25 LAMPS

All lamps shall be suitable for normal stated supply voltage and the number and sizes of lamps detailed on the drawings shall be supplied and fixed. The Sub-Contractor must verify the actual supply voltage with the supply authority before ordering the lamps.

Tungsten filament lamps shall be manufactured in accordance with KS 04 – 112:1978 for general service lamps and KS 04 – 307:1985 for lamps other than general services. Tubular fluorescent lamps shall comply with KS 04 – 464:1982

LED lamps shall be used in all fittings unless otherwise specified. The minimum luminous flux allowed is 95 lumens per Watt, minimum life time of 50,000hrs, minimum power factor of 0.9, voltage range of 100-240V, THD <15% amongst others..

2.26 LIGHTING FITTINGS AND STREET LIGHTING LANTERNS

This Sub-Contract shall include for the provision, handling charges, taking the delivery, safe storage, wiring (including internal wiring) assembling and erecting of all lighting fittings shown on the drawings.

All fittings and pendants shall be fixed to the conduit boxes with brass R/H screws. These to be in line with metal finish of fittings. The lighting fittings are detailed for the purpose of establishing a high standard of finish and under no circumstances will substitute fittings be permitted.

In case of rectangular shaped ceiling fittings, the extreme ends of the fittings shall be secured to suitable support in addition to the central conduit box fittings. Supports shall be provided and fixed by the Sub-Contractor.

The whole of the metal work of each lighting fittings shall be effectively bonded to earth. In the case of ball and/or knuckle joints short lengths of flexible cable shall be provided, bonded to the metal work on either side of the joints. If the above provisions are not made by the manufacturers -, the Sub-contractor shall include cost of additional work necessary in his tender. See “Flexible Cords” clause for details of internal wiring of lighting fittings.

Minimum size of internal wiring shall be 20/0.20mm (23/0067). Each lighting fitting shall be provided with number type and size of lamps as detailed on the drawings. It is to be noted that some fittings are suspended as shown on the drawings.

Where two or more points are shown adjacent to each other on the drawings, e.g socket outlet and telephone outlet, they shall be lined up vertically or horizontally on the centre lines of the units concerned.

Normally, the units shall be lined up on vertical centre lines, but where it is necessary to mount units at low level they shall be lined up horizontally.

2.27 POSITIONS OF POINTS AND SWITCHES

Although the approximate positions of all points are shown on the drawings, enquiry shall be made as to the exact positions of all M.C.B panels, lighting points, socket outlets etc, before work is actually commenced. The Sub-contractor must approach the Architect with regard to the final layout of all lights on the ceiling and walls.

The Sub-contractor must consult with the Engineer in liaison with the Clerk of Works, or the General Foreman on site regarding the positions of all points before fixing any conduit etc. The Sub- Contractor shall be responsible for all alterations made necessary by the non-compliance with the clause.

2.28 CURRENT OPERATED EARTH LEAKAGE CIRCUIT BREAKER

Current operated earth leakage circuit breaker shall conform to B.S.S. 4293:68 rated at 240 volts D.P. 50 cycles A.C. Mains.

The breaker shall be provided with test switch and fitted in weather proof enclosure for surface mounting. The rated load current and earth fault operating current shall be as specified in the drawings. These shall be as manufactured by Crabtree, Siemens or other equal and approved.

When switches are arranged in their formation all necessary horizontal and vertical barriers shall be provided to ensure segregation from adjacent units. Means of locking the switch in the "OFF" position shall be provided.

2.29 STEEL CONDUITS AND STEEL TRUNKING

Conduits shall be of heavy gauge class "B" welded to Standard specification KS 04-180:1985. In no case will conduit smaller than 20mm diameter be used on the works. Conduits installed within buildings shall be black enamelled finish except where specified otherwise. Where installed externally or in damp conditions they shall be galvanised. Conduit fittings, accessories or equipment used in conjunction with galvanised conduits shall also be galvanised or otherwise as approved by the service engineer.

Metal trunking shall be fabricated from mild steel of not less than 18 swg. All sections of trunking shall be rigidly fixed together and attached to the framework or fabric or the building at intervals of not less than 1.2m. Joint trunking shall not overhang fixing points by more than 0.5m.

All trunking shall be made electrically continuous by means of 25 x 3mm copper links across each joint and where the trunking is galvanised, the links shall be made by galvanised flat iron strips.

All trunking fittings (i.e. Bends, tees, etc) shall leave the main through completely clear of obstructions and continuously open except through walls and floors at which points suitable fire resisting barriers shall be provided as may be necessary. The inner edge of bends and tees shall be chamfered where cables larger than 35mm² are employed.

Where trunking passes through ceilings and walls the cover shall be solidly fixed to 150mm either side of ceilings and floors and 50mm either side of walls.

Screws and bolts securing covers to trunking or sections of covers together shall be arranged so that damage to cables cannot occur either when fixing covers or when installing cables in the trough.

Where trunking is used to connect switchgear or fuseboards, such connections shall be made by trunking fittings manufactured for this purpose and not by multiple conduit couplings.

Where vertical sections of trunking are used which exceed 4.5m in length, staggered tie off points shall be provided at 4.5m intervals to support the weight of cables.

Unless otherwise stated, all trunking systems shall be painted as for conduit.

Where a wiring system incorporates galvanised conduit and trunking, the trunking shall be deemed to be galvanised unless specified otherwise.

The number of cables to be installed in trunking shall be such as to permit easy drawing in without damage to the cables, and shall in no circumstances be such that a space factor of 45% is exceeded.

Conduit and trunking shall be mechanically and electrically continuous. Conduit shall be tightly screwed between the various lengths so that they butt at the socketed joints. The internal edges of conduit and all fittings shall be smooth, free from burrs and other defects.

Oil and any other insulating substance shall be removed from the screw threads; where conduits terminate in fuse-gear, distribution boards, adaptable boxes, non-spouted switchboxes, etc., they shall, unless otherwise stated, be connected thereto by means of smooth bore male brass bushes, compression washers and sockets. All exposed threads and abrasions shall be painted using an oil paint for black enameled tubing and galvanizing paint for galvanised tubing immediately after the conduits are erected. All bends and sets shall be made cold without altering the section of the conduit.

The inner radius of the bend shall not be less than four (4) times the outside diameter of the conduit. Not more than two right angle bends will be permitted without the inter-position of a draw-in-box. Where straight runs of conduit are installed, draw-in-boxes shall be provided at distances not exceeding 15m. No tees, elbows, sleeves, either of inspection or solid type, will be permitted.

Conduit shall be swabbed out prior to drawing in cables, and they shall be laid so as to drain of all condensed moisture without injury to end connections.

Conduits and trunking shall be run at least 150mm clear of hot water and steam pipes, and at least 75mm clear of cold water and other services unless otherwise approved by the services engineer.

All boxes shall conform to KS 04 – 668: 1986, to be of malleable iron, and black enamelled or galvanised according to the type of conduit specified. All accessory boxes shall have threaded brass inserts.

Box lids where required shall be heavy gauge metal, secured by means of zinc plated or cadmium plated steel screws.

All adaptable boxes and lids of the same size shall be interchangeable.

Boxes used on surface work are to be tapped or drilled to line up with the conduit fixed in distance type saddles allowing clearance between the conduit and wall without the need for setting the conduit.

Where used in conjunction with mineral insulated copper sheathed cable, galvanised boxes shall be used and painted after erection.

Draw-in boxes in the floors are generally to be avoided but where they are essential they must be grouped in positions approved by the services engineer and covered and by the suitable floor traps, with non-ferrous trays and covers.

The floor trap covers are to be recessed and filled in with a material to match the floor surface.

The Sub-contractor must take full responsibility for the filling in of all covers, but the filling in material will be supplied and the filling carried out by the main building contractor.

Where buried in the ground outside the building the whole of the buried conduit is to be painted with two coats of approved bitumastic composition before covering up.

Where run on the surface, unpainted fittings and joints shall be painted with two coats of oil bound enamel applied to rust and grease free metalwork.

2.30 TESTING ON SITE

The Sub-contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specification and the Electric Supply Company's By-Laws.

- (a) Tests shall be carried out to prove that all single pole switches are installed in the 'live' conductor.
- (b) Tests shall be carried out to prove that all socket outlets and switched socket outlets are connected to the 'live' conductor in the terminal marked as such, and that each earth pin is effectively bonded to the earth continuity system. Tests shall be carried out to verify the continuity of all conductors of each 'ring' circuit.
- (c) Phase tests shall be carried out on completion of the installation to ensure that correct phase sequence is maintained throughout the installation. Triplicate copies of the results of the above tests shall be provided within 14 days of the witnessed tests and the Sub-contractor will be required to issue to the service engineer the requisite certificate upon completion as required by the regulations referred to above.
- (d) Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation made apparently by such inspections or tests shall be rectified by the Sub-contractor at his own expense.
- (e) The Sub-contractor shall provide accurate instruments and apparatus and all labour required to carry out the above tests. The instruments and apparatus shall be made available to the services engineer to enable him to carry out such tests as he may require.
- (f) The Sub-contractor shall generally attend on other contractors employed on the project and carry out such electrical tests as may be necessary.
- (g) The Sub-contractor shall test to the services engineer's approval and as specified elsewhere in this specification or in standards and regulations already referred to, all equipment, plant and apparatus forming part of the works and before connecting to any power or other supply and setting to work.
- (h) Where such equipment, etc., forms part of or is connected to a system whether primarily or of an electrical nature or otherwise (e.g. air conditioning system) the Sub-contractor shall attend on and assist in balancing, regulating testing and commissioning, or if primarily an electrical or other system forming part of works, shall balance, regulate, test and commission the system to the service engineer's approval.

APPENDIX TO GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

The electrical sub-contractor shall comply with the following:-

1. Government Electrical Specifications No. 1 and No. 2.
2. All requirements of Kenya Power Company Limited, and Communications Authority of Kenya (CA).

SECTION C

SCHEDULE OF CONTRACT DRAWINGS

SCHEDULE OF CONTRACT DRAWINGS

There are currently no drawings in this contract.

The drawings shall however be availed, on award of the tender, to the nominated Sub contractor.

SECTION D
PARTICULAR SPECIFICATIONS
OF
MATERIALS AND WORKS

PART 1

PARTICULAR SPECIFICATIONS OF MATERIALS AND WORKS

1.00 SITE LOCATION

The location of the proposed works is in Upper Kabete, Nairobi County.

2.0 SCOPE OF WORKS

The works to be carried out under this sub-contract comprise of but not limited to the supply, installation, of conduiting works for Electrical for Electrical Engineering Services

3.0 MATERIALS FOR THE WORKS

Materials shall be as specified in Section D and in the Bills of Quantities of this document which shall be read in conjunction with contract drawings. Alternative materials shall be accepted only after approval by the Project Manager.

SECTION E
SCHEDULE OF UNIT RATES

SCHEDULE OF UNIT RATES

1. The tenderer shall insert unit rates against the items in the following schedules and may add such other items as he considers appropriate.
 2. The unit rates shall include for supply, transport, insurance, delivery to site, storage as necessary, assembling, cleaning, installing, connecting, profit and maintenance in defects liability and any other obligation under this contract.
 3. The unit rates will be used to assess the value of additions or omissions arising from authorised variations to the contract works.
-
1. Where trade names or manufacturer's catalogue numbers are mentioned in the specification, the reference is intended as a guide to the type of article or quality of material required. Alternative brands of equal and approved quality will be accepted.
 2. Any bid returned with unfilled Schedule of Unit Rates shall be considered technically non-responsive, and the bidder shall automatically be disqualified.

SCHEDULE OF UNIT RATES
(MUST be completed by the Tenderer)

Item	Description	Unit	Qty	Rate (KShs)
	<u>Conduit</u> Supply and Installation per linear metre including fixing of all accessories of PVC conduit of the following sizes: 40mm	1	LM	

SECTION F
BILLS OF QUANTITIES

BILLS OF QUANTITIES

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 No.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 contract. 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 and Other Bills

The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications.

The unit of measurements and observations are as per those described in clause 1.05 of the section C.

c) Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The sub-contractor 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

B) NOTES FOR BILLS OF QUANTITIES

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% V.A.T and all taxes applicable at the time of tender.**
- 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.
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 to. Otherwise alternative brands of **equal and approved** quality will be accepted.

Should the sub-contractor install any material not specified here in before receiving **approval** 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.**
6. Tenderers must enclose, together with their submitted tenders, **detailed manufacturer's Brochures** detailing Technical Literature and specifications on the items they intend to offer.

This shall be used in the tender evaluation to determine the first line aesthetics and quality of fittings offered.

PROPOSED ERECTION AND COMPLETION OF KENYA DAIRY BOARD ADMINISTRATION BLOCK AT UPPER KABETE

W.P ITEM No. D116/CE/KMB/1601 JOB NO. 10126C

ELECTRICAL INSTALLATION WORKS

BILL No. 1: Preliminaries

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS
1	Discrepancies clause 1.02				
2	Conditions of sub-contract Agreement clause 1.03				
3	Payments clause 1.04				
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 3.14 (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause 1.15				
11	Government Legislation and Regulations clause 1.16				
12	Import Duty and Value Added Tax clause 1.17 (Note this clause applies for materials supplied only. VAT will also be paid by the sub-contractor as allowed in the summary page)				
13	Insurance company Fees clause 1.18				
14	Provision of services by the Main contractor clause 1.19				
15	Samples and Materials Generally clause 1.21				
SUB-TOTAL CARRIED TO PAGE F/5					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS
16	Supplies clause 1.20				
17	Bills of Quantities clause 1.23				
	Contractor's Office in Kenya clause 1.24				
18	Builder's Work clause 1.25				
19	Setting to work and Regulating system clause 1.29				
20	Identification of plant components clause 1.30				
21	Working Drawings clause 1.32				
22	Record Drawings(As Installed) and Instructions clause 1.33				
23	Maintenance Manual clause 1.34				
24	Hand over clause 1.35				
25	Painting clause 1.36				
26	Testing and Inspection – manufactured plant clause 1.38				
27	Testing and Inspection – Installation clause 1.39				
28	Storage of Materials clause 1.41				
29	Initial Maintenance clause 1.42				
	SUB-TOTAL CARRIED TO PAGE F/5				

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS
30	Local and other Authorities notices and fees clause 1.60				
31	Temporary Works clause 1.63				
32	Patent Rights clause 1.64				
33	Mobilization and Demobilization Clause 1.65				
34	Extended Preliminaries Clause 1.66 (see Appendix - clause 1.70)				
35	Supervision by Engineer and Site Meetings Clause 1.67	1	Item	200,000	200,000.00
36	Allow for profit and Attendance for the above	1	Item		
37	Amendment to Scope of Sub-contract Works Clause 1.68				
38	Contractor obligation and Employers Obligation clause 1.69.				
	Sub-total above				
	Sub-total brought forward from page F-3				
	Sub-total brought forward from page F-4				
	TOTAL FOR SCHEDULE No. 1- PRELIMINARIES- CARRIED FORWARD TO PRICE SUMMARY PAGE F/17				

BILL No. 2: GROUND FLOOR

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	SUPPLY, DELIVER, INSTALL, TEST AND COMMISSION THE FOLLOWING:-				
	LIGHTING POINTS AND SWITCHES				
2.00	20mmØ concealed HG/PVC conduiting for Lighting points	97	No.		
2.01	20mmØ concealed HG/PVC conduiting for 10A, moulded plastic ivory white switch plates	15	No.		
	POWER POINTS				
2.02	25mmØ concealed HG/PVC conduiting for Power socket outlet power points	20	No.		
2.03	25mmØ concealed HG/PVC conduiting for Clean/UPS power socket outlet power points	4	No.		
2.04	32mmØ concealed HG/PVC conduiting for Air Conditioning Unit power points	1	No.		
2.05	32mmØ concealed HG/PVC conduiting Toilet Urinal sensor power points	2	No.		
2.06	32mmØ concealed HG/PVC conduiting for Hand Dryer power points	2	No.		
2.07	32mmØ concealed HG/PVC conduiting for Fire alarm panel power points	1	No.		
	DATA/TELEPHONE/TELEVISION & ACCESS CONTROL				
2.08	20mm Ø HG PVC Conduits for C.C.T.V points	8	No.		
2.09	25mmØ HG PVC conduits for Television cord outlet points	3	No.		
2.10	25mmØ HG PVC conduits for Data/Telephone outlet points	10	No.		
2.11	250x250x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	1	No		
2.12	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
	FIRE ALARM SYSTEM				
2.13	20mmØ concealed HG/PVC conduiting for Fire Alarm points	17	No.		
	RAW POWER DISTRIBUTION BOARDS				
2.14	2x50mmØ PVC HG conduit linking for 25 mm ² 4-C PVC/SWA/PVC copper cable to DB	20	Lm		
2.15	300x300x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No.		
2.16	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
Total carried for Bill No. 2 C/F to Price Summary Page F/17					

BILL No. 3: FIRST FLOOR

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	SUPPLY, DELIVER, INSTALL, TEST AND COMMISSION THE FOLLOWING:- LIGHTING POINTS AND SWITCHES				
3.00	20mmØ concealed HG/PVC conduiting for Lighting points	107	No.		
3.01	20mmØ concealed HG/PVC conduiting for 10A, moulded plastic ivory white switch plates	31	No.		
	POWER POINTS				
3.02	25mmØ concealed HG/PVC conduiting for Power socket outlet power points	48	No.		
3.03	25mmØ concealed HG/PVC conduiting for Clean/UPS power socket outlet power points	6	No.		
3.04	32mmØ concealed HG/PVC conduiting for Air Conditioning Unit power points	2	No.		
3.05	32mmØ concealed HG/PVC conduiting Toilet Urinal sensor power points	2	No.		
3.06	32mmØ concealed HG/PVC conduiting for Hand Dryer power points	2	No.		
3.07	32mmØ concealed HG/PVC conduiting for Cooker power points	1	No.		
3.08	32mmØ concealed HG/PVC conduiting for Undersink water heater points	1	No.		
3.09	32mmØ concealed HG/PVC conduiting for repeater Fire alarm panel power points	1	No.		
3.10	25mmØ HG PVC conduits for Television cord outlet points	3	No.		
3.11	20mm Ø HG PVC Conduits for C.C.T.V points	8	No.		
3.12	25mmØ HG PVC conduits for Data/Telephone outlet points	15	No.		
3.13	250x250x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No		
3.14	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
	FIRE ALARM SYSTEM				
3.15	20mmØ concealed HG/PVC conduiting for Fire Alarm points	18	No.		
	RAW POWER DISTRIBUTION BOARDS				
3.12	50mmØ PVC HG conduit linking for 25 mm ² 4-C PVC/SWA/PVC copper cable to DB	25	Lm		
3.13	300x300x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No.		
3.14	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
Total carried for Bill No. 3 C/F to Price Summary Page F/17					

BILL No. 4: SECOND FLOOR

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	SUPPLY, DELIVER, INSTALL, TEST AND COMMISSION THE FOLLOWING:-				
	LIGHTING POINTS AND SWITCHES				
4.00	20mmØ concealed HG/PVC conduiting for Lighting points	113	No.		
4.01	20mmØ concealed HG/PVC conduiting for 10A, moulded plastic ivory white switch plates	30	No.		
	POWER POINTS				
4.02	25mmØ concealed HG/PVC conduiting for Power socket outlet power points	48	No.		
4.03	25mmØ concealed HG/PVC conduiting for Clean/UPS power socket outlet power points	6	No.		
4.04	32mmØ concealed HG/PVC conduiting for Air Conditioning Unit power points	2	No.		
4.05	32mmØ concealed HG/PVC conduiting Toilet Urinal sensor power points	2	No.		
4.06	32mmØ concealed HG/PVC conduiting for Hand Dryer power points	2	No.		
4.07	32mmØ concealed HG/PVC conduiting for Cooker power points	1	No.		
4.08	32mmØ concealed HG/PVC conduiting for Undersink water heater points	1	No.		
4.09	32mmØ concealed HG/PVC conduiting for repeater Fire alarm panel power points	1	No.		
4.10	Access Control outlet points comprising 25mmØ HG PVC conduits	2	No.		
4.11	25mmØ HG PVC conduits for Television cord outlet points	3	No.		
4.12	20mm Ø HG PVC Conduits for C.C.T.V points	8	No.		
4.13	25mmØ HG PVC conduits for Data/Telephone outlet points	15	No.		
4.14	250x250x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No		
4.15	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
	FIRE ALARM SYSTEM				
4.16	20mmØ concealed HG/PVC conduiting for Fire Alarm points	18	No.		
	RAW POWER DISTRIBUTION BOARDS				
4.17	50mmØ PVC HG conduit linking for 25 mm ² 4-C PVC/SWA/PVC copper cable to DB	30	Lm		
4.18	300x300x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No.		
4.19	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
Total carried for Bill No. 4 C/F to Price Summary Page F/17					

BILL No. 5: THIRD FLOOR

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	SUPPLY, DELIVER, INSTALL, TEST AND COMMISSION THE FOLLOWING:- LIGHTING POINTS AND SWITCHES				
5.00	20mmØ concealed HG/PVC conduiting for Lighting points	112	No.		
5.01	20mmØ concealed HG/PVC conduiting for 10A, moulded plastic ivory white switch plates	34	No.		
	POWER POINTS				
5.02	25mmØ concealed HG/PVC conduiting for Power socket outlet power points	48	No.		
5.03	25mmØ concealed HG/PVC conduiting for Clean/UPS power socket outlet power points	4	No.		
5.04	32mmØ concealed HG/PVC conduiting for Air Conditioning Unit power points	4	No.		
5.05	32mmØ concealed HG/PVC conduiting Toilet Urinal sensor power points	2	No.		
5.06	32mmØ concealed HG/PVC conduiting for Hand dryer power points	2	No.		
5.07	32mmØ concealed HG/PVC conduiting for Instant shower power points	2	No.		
5.08	32mmØ concealed HG/PVC conduiting for Cooker power points	1	No.		
5.09	32mmØ concealed HG/PVC conduiting for Undersink water heater points	1	No.		
5.10	32mmØ concealed HG/PVC conduiting for repeater Fire alarm panel power points	1	No.		
5.11	Access Control outlet points comprising 25mmØ HG PVC conduits	6	No.		
5.12	25mmØ HG PVC conduits for Television cord outlet points	3	No.		
5.13	20mm Ø HG PVC Conduits for C.C.T.V points	8	No.		
5.14	25mmØ HG PVC conduits for Data/Telephone outlet points	20	No.		
5.15	250x250x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No		
5.16	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
	FIRE ALARM SYSTEM				
5.17	20mmØ concealed HG/PVC conduiting for Fire Alarm points	34	No.		
	POWER DISTRIBUTION				
5.18	50mmØ PVC HG conduit linking for 25 mm ² 4-C PVC/SWA/PVC copper cable to DB	35	Lm		
5.19	300x300x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No.		
5.20	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
Total carried for Bill No. 5 C/F to Price Summary Page F/17					

BILL No. 6: FOURTH FLOOR

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	SUPPLY, DELIVER, INSTALL, TEST AND COMMISSION THE FOLLOWING:-				
	LIGHTING POINTS AND SWITCHES				
6.00	20mmØ concealed HG/PVC conduiting for Lighting points	128	No.		
6.01	20mmØ concealed HG/PVC conduiting for 10A, moulded plastic ivory white switch plates	34	No.		
	POWER POINTS				
6.02	25mmØ concealed HG/PVC conduiting for Power socket outlet power points	38	No.		
6.03	25mmØ concealed HG/PVC conduiting for Clean/UPS power socket outlet power points	10	No.		
6.04	32mmØ concealed HG/PVC conduiting for Air Conditioning Unit power points	7	No.		
6.05	32mmØ concealed HG/PVC conduiting for Hand dryer power points	2	No.		
6.06	32mmØ concealed HG/PVC conduiting for Instant shower power points	5	No.		
6.07	32mmØ concealed HG/PVC conduiting for repeater Fire alarm panel power points	1	No.		
6.08	25mmØ HG PVC conduits for Television cord outlet points	3	No.		
6.09	20mm Ø HG PVC Conduits for C.C.T.V points	8	No.		
6.10	25mmØ HG PVC conduits for Data/Telephone outlet points	20	No.		
6.11	250x250x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	4	No		
6.12	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
	FIRE ALARM SYSTEM				
6.13	20mmØ concealed HG/PVC conduiting for Fire Alarm points	24	No.		
6.14	50mmØ PVC HG conduit linking for 25 mm ² 4-C PVC/SWA/PVC copper cable to DB	40	Lm		
6.15	150x75mm, 14SWG cable tray c/w mounting row bolts and all other necessary accessories	30	Lm		
6.16	300x300x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No.		
6.17	2x50mmØ PVC HG conduit linking the Draw Boxes	100	LM		
Total carried for Bill No. 6 C/F to Price Summary Page F/17					

BILL No. 7: LIFT POWER PROVISIONS

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	SUPPLY, DELIVER, INSTALL, TEST AND COMMISSION THE FOLLOWING:-				
	LIGHTING POINTS AND SWITCHES				
7.00	20mmØ concealed HG/PVC conduiting for Lighting points	16	No.		
7.01	20mmØ concealed HG/PVC conduiting for 10A, moulded plastic ivory white switch plates	2	No.		
	POWER POINTS				
7.02	50 mm diam. HG PVC conduits Three Phase Lift motor power points	60	LM.		
	FIRE ALARM SYSTEM				
7.03	25mmØ concealed HG/PVC conduiting for Power socket outlet power points	3	No.		
	RAW POWER DISTRIBUTION BOARDS				
7.04	125A, 4-Way, TPN DB surface/flush mounted as EATON or approved equivalent	1	No.		
7.05	SP Miniature circuit breakers for the distribution boards above				
	i) 10A SP MCB	1	No.		
	ii) 63A TP MCB	1	No.		
	iii) TP blanking plates	3	No.		
	iii) SP blanking plates	1	No.		
	SUB-MAINS & FEEDER CABLES				
7.06	50mmØ PVC HG conduit for 25 mm ² 4-C PVC/SWA/PVC copper cable to DB	30	Lm		
	i) Cable glands for above cable	4	No.		
7.07	300x300x75mm recessed galvanised sheet steel draw boxes compete with powder coated cover and all other necessary accessories	2	No.		
Total carried for Bill No. 7 C/F to Price Summary Page F/17					

BILL No. 8: POWER DISTRIBUTION

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
8.00	100mmØ PVC HG conduit for 300 mm ² 4-C PVC/SWA/PVC copper cable from KPLC Turret to board above c/w appropriate cable lugs from Main KPLC Meter to main LV Board	40	Lm		
8.01	100mmØ PVC HG conduit for 185 mm ² 4-C PVC/SWA/PVC copper cable from KPLC Turret to board above c/w appropriate cable lugs	100	Lm		
8.02	Construct 600mm x 600mm x 600mm deep concrete telephone manhole complete with cast iron waterproof cover as per technical specifications to Engineer's approval	1	No.		
8.03	50mmØ PVC HG conduit for Wiring from the LV Board to Lift	30	Lm		
	Clean Power Installation				
8.04	50mmØ PVC HG conduit for 10 mm ² 4Core PVC/SWA/PVC Copper cables laid in 50mm HG PVC duct from Main DB to the UPS	30	LM		
8.05	50mmØ PVC HG conduit for 10 mm ² 4Core PVC/SWA/PVC Copper cables laid in 50mm HG PVC duct from UPS to the Distribution Board	10	LM		
	AIR CONDITIONING/COLD ROOM OUTDOOR UNIT POWER SUPPLY				
8.06	50mmØ PVC HG conduit for 10 mm ² 4-C PVC/SWA/PVC copper cable to power D.B's c/w appropriate cable lugs for the Outdoor AC unit	30	Lm		
Total for Bill No. 8 C/F to Bills Summary Page F/17					

BILL No. 9: LIGHTNING PROTECTION

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
	Supply, install, test and commission the following:				
	AIR TERMINATION				
9.00	Supply and lay along the ridge cap 25mm X 3mm thick bare copper tape as Furse or approved equivalent	180	M		
9.01	State Holdfast for the above tape as Furse or approved equivalent	180	No.		
9.02	Air termination spike comprising 2000mm by 15mm diameter copper rod, Copper multiple point and Copper ridge saddle as Furse or approved equivalent	8	Item		
	DOWNWARD CONDUCTOR				
9.03	Downward conductor comprising 25mm x 3mm thick bare copper tape as item 6.00	180	M		
9.04	Copper square tape clamp for making crossing tape joints as Furse or approved equivalent	5	No.		
9.05	DC tape clips for fixing the down conductors to the wall as Furse or approved equivalent	70	No.		
9.06	Copper Oblong test clamp as Furse or approved equivalent	5	No.		
9.07	Steel conduits 32 mm diameter conduit.	70	M		
9.08	Saddles for the above item 6.07	70	No.		
	EARTHING				
9.09	Earth inspection concrete chamber 300mm x 300mm x 300mm with an air tight inspection cover to approval.	4	No.		
9.10	16 mm nominal diameter by 1500mm threaded copper bond earth rod driven to ground as Furse or approved equivalent	4	No.		
9.11	Driving stud for the above item as Furse or approved equivalent	4	No.		
9.12	Earth electrode rod - to - downward conductor copper tape clamps as Furse or approved equivalent	4	No.		
9.13	Allow for appropriate transient over voltage protection equipment on all power switchboards, telephone, data and structured cables entering or leaving the building, in order to protect equipment connected to power distribution system against transient over voltages coming into the building from outside, all as per the requirements of the technical specifications and to Engineer's approval	1	Item		
9.14	Allow for testing and commissioning for entire lightning protection and grounding system to Engineer's approval	1	Item		
Total for Bill No. 9 C/F to Bills summary Page F/17					

BILL No. 10: ENGINEER'S STATIONERY

Item	Description	Qty	Unit	Rate (KShs)	Amount (KShs)
	<i>Supply, Install, Test and Commission the following as described below:</i>				
6.00	Laserjet Printer as HP M402-M403 n-dne PCL6	2	No		
6.01	Toner for the above printer	5	No		
Total for Bill No. 10 C/F to Summary Page F/17					

	BILLS SUMMARY PAGE	AMOUNT
1	TOTAL FOR BILL No. 2 B/F Page F/6.....	
2	TOTAL FOR BILL No. 3 B/F Page F/7.....	
3	TOTAL FOR BILL No. 4 B/F Page F/8.....	
4	TOTAL FOR BILL No. 5 B/F Page F/9.....	
5	TOTAL FOR BILL No. 6 B/F Page F/10.....	
6	TOTAL FOR BILL No. 7 B/F Page F/11.....	
7	TOTAL FOR BILL No. 8 B/F Page F/12.....	
8	TOTAL FOR BILL No. 9 B/F Page F/13.....	
9	TOTAL FOR BILL No. 10 B/F Page F/14.....	
TOTAL FOR ELECTRICAL WORKS C/F TO PRICE SUMMARY PAGE F/17		

PROVISIONAL SUMS

Item	Description	Cost Kshs
	CONTINGENCY	
A.	Allow a Provisional Sum of Kshs. Two Hundred Thousand (200,000.00) only contingency to be used at the discretion of the Project Engineer	200,000.00
B	Allow a Provisional Sum of Kshs. One Hundred Thousand (100,000.00) only for CPD Training	100,000.00
Sub total for PROVISIONAL Sums C/F to price Summary page F/17		400,000.00

SUMMARY PAGE

Item	Description	Cost Kshs
A.	PRELIMINARIES AND GENERAL CONDITIONS B/F FROM F/5.....	
B	SUB-TOTAL FOR ELECTRICAL WORKS B/F FROM BILLS SUMMARY PAGE F/15.....	
C.	SUB TOTAL FOR PROVISIONAL SUMS B/F FROM PAGE F/16.....	300,000.00
	TOTAL COST FOR ELECTRICAL INSTALLATION WORKS CARRIED FORWARD TO GRAND SUMMARY PAGE	

SECTION G
STANDARD FORMS

CONTENTS OF SECTION G

	<u>TITLE</u>	<u>PAGE</u>
1.	Contents	Elect- G/1
2.	Tender Questionnaire	Elect- G/2
3.	Confidential Business Questionnaire	Elect- G/3 - G/4
4.	Key Personnel	Elect- G/5
5.	Schedule of Contracts completed in the last five (5) years	Elect- G/6
6.	Schedule of on-going projects	Elect- G/7
7.	Contractor's Equipment	Elect- G/8
8.	Financial Reports for the last five (5) years	Elect- G/9
9.	Evidence of Financial Resources to Meet Qualification Requirements	Elect- G/10
10.	Bidder's Bank Information	Elect- G/11
11.	Details of Litigation or Arbitration Proceedings	Elect- G/12
12.	Commissioning Guide for Electrical Installation works	Elect- G/13 - G/18
13.	Statement of Compliance	Elect- G/19

NOTE:

Tenderers must duly fill these Standard Forms as a mandatory requirement as they will form part the evaluation criteria.

TENDER
QUESTIONNAIRE

Please fill in block letters.

1. Full names of Bidder (Specialized Works)

.....

2. Full address of Bidder (Specialized Works) to which tender correspondence is to be sent
(unless an agent has been appointed below):

.....

3. Telephone number (s) of Tenderer:

.....

4. Telex/Fax Address of Tenderer:

.....

5. Name of Tenderer's representative to be contacted on matters of the tender during the tender period:

.....

6. Details of Tenderer's nominated agent (if any) to receive tender notices. This is essential if the Tenderer does not have his registered address in Kenya (name, address, telephone, telex):

.....

.....

Signature of Tenderer

Make copy and deliver to:

The Managing Director,
Kenya Dairy Board,
P.O BOX 30406-00100,
NAIROBI.

CONFIDENTIAL BUSINESS QUESTIONNAIRE

You are requested to give the particulars indicated in Part 1 and either Part 2 (a), 2 (b) or 2(c) and (2d) whichever applies to your type of business.

You are advised that it is a serious offence to give false information on this Form.

Part 1 – General

Business Name

Location of business premises: Country/Town.....

Plot No..... Street/Road

Postal Address..... Tel No.....

Nature of Business.....

Current Trade Licence No..... Expiring date.....

Maximum value of business which you can handle at any time:

Kenya Shillings.....

Name of your bankers.....

Branch.....

Address.....Telephone.....

Part 2 (a) – Sole Proprietor

Your name in full..... Age.....

Nationality..... Country of Origin.....

Citizenship details

Part 2 (b)– Partnership

Give details of partners as follows:

	Name in full	Nationality	Citizenship Details	Shares
1.
2.
3.
4.

KEY PERSONNEL

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

POSITION	NAME	HIGHEST QUALIFICATION (Attach proof)	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION

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, complexity and volume over the last 5 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

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?)

FINANCIAL REPORTS FOR THE LAST FIVE YEARS

(Balance sheets, Profits and Loss Statements, Auditor's reports, etc.
List below and attach copies)

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

EVIDENCE OF FINANCIAL RESOURCES TO MEET QUALIFICATION REQUIREMENTS

(Cash in hand, Lines of credit, e.t.c. List below and attach copies of supportive documents)

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

BIDDER'S BANK INFORMATION

(This information is mandatory and should be for banks to provide reference if contacted by employer)

NAME OF BANK	BANK BRANCH	ACCOUNT NAME	ADDRESS	TELEPHONE

DETAILS OF LITIGATION OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER HAS BEEN INVOLVED AS ONE OF THE PARTIES IN THE LAST 5 YEARS

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



REPUBLIC OF KENYA

STATE DEPARTMENT FOR PUBLIC WORKS

ELECTRICAL & MECHANICAL (BS) ENGINEERING DEPARTMENTS

TESTING & COMMISSIONING GUIDE
FOR
ELECTRICAL INSTALLATION WORKS ON SITE

Issued by:

The Chief Engineer (Electrical),
State Department of Public Works,
P. O. BOX 41191 – 00100 GPO,
NAIROBI.

STATE DEPARTMENT FOR PUBLIC WORKS

ELECTRICAL DEPARTMENT

TESTING AND COMMISSIONING OF ELECTRICAL INSTALLATION WORKS ON SITE.

PROJECT

NAME.....

..

W.P. NO.: JOB No.....

The sub contractor shall test in accordance with the relevant section of IEE regulations, Rule 3 of the Electrical Power Act for additional tests not covered by the regulations, Government Electrical specifications I & II and the Kenya Power & Lighting Co. Ltd by-laws.

A PRELIMINARY CHECKS

The Engineer shall check to establish the following data:-

ITEM	DESCRIPTION		REMARKS
(i)	Type of installation (New/Renovation/Addition/ to existing installation)		
(ii)	a) Power supply 240V/415V/11KV	
	b) Frequency of the mains supply	
	c) Installation power factor	
(iii)	Method of Metering (New /Monitoring/Existing meter)		
(iv)	Are Testing/Measuring instruments available		
(v)	Are there maintenance/operational manuals for specialized systems (if any)		
(vi)	List of 'as installed drawings'	Drg No.	Description

B. TESTS

ITEM	TEST DESCRIPTION	OBSERVATIONS/ RESULTS	REMARKS
1	Tests shall be carried out to ensure:		
	a) All fuses and single pole switches are installed in live conductor		
	b) All outlets and switched socket outlets are connected to 'LIVE' conductor in the Terminal marked so and each earth pin effectively bonded to earth continuity system		
	c) Verify continuity of all final conductors of each 'Ring' circuit. (0.05 to 0.8Ω)Ohms	
	d) All radial circuits emanate from respective distribution boards/consumer units and that they do not supply any other Equipment		
	e) The correct phase sequence is maintained throughout the installation		
	f) Effective 'Discrimination' in the arrangement of protective devices. i.e. a fault in the furthest power point/Lighting point should not blow or trip Fuses/MCBs respective in the Meter board.		
2	Inspect to ensure:		
	a) No terminal in the Ceiling Rose is 'LIVE' when the corresponding switch is in the off position.		
	b) All conduit termination conduit boxes, Consumer unit, DB's and Adaptable boxes have smooth edges and are properly bushed.		
	c) All fixed metal works close to Electrical installation are bonded to earth continuity conductor.		
	d) All Fuse ways and Circuit breakers for final sub circuits are properly labeled		

B TESTS CONT'D

ITEM	TEST DESCRIPTION	OBSERVATIONS/ RESULTS	REMARKS	
3	Carry out the following tests:			
	a) Insulation Resistance tests <ul style="list-style-type: none"> i) Between phases <ul style="list-style-type: none"> a) R -YMΩ b) R -BMΩ c) B-YMΩ ii) Phase to Neutral <ul style="list-style-type: none"> a) R - NMΩ b) R - NMΩ c) B - NMΩ iii) Phase to Earth <ul style="list-style-type: none"> a) R - EMΩ b) R -EMΩ c) B -EMΩ <p>Minimum thresholds for above and for:</p> <ul style="list-style-type: none"> i) ELV circuits (SELV & PELV) = 0.25 MΩ ii) LV Circuits up to 500V = 0.5 MΩ iii) LV Circuits above 500V = 1 MΩ 			
	b) Earth continuity conductor impedance (0.005 to 2Ω)Ohms		
	c) Earth fault Loop impedance (0 - 2000 Ω)Ohms		
	d) Earth Electrode resistance (Less than 4Ω)Ohms		
	e) Earth Lead resistance (Less than 4Ω)Ohms		
	f) The operation of protection MCCBS & MCBS (Tripping under faulty conditions)			
	g) Check the mechanical toggling (make & break) of all the switches to installed accessories.			
	4	Underground cabling, Check for:		
		i) Continuity of the phases		
ii) Factory tests done (avail certification)				
iii) Proper termination				
iv) Route markers				

B TESTS CONT'D

ITEM	TEST DESCRIPTION	OBSERVATIONS/ RESULTS	REMARKS	
5	Installed load			
	i) Lighting points (No.)			
	ii) Socket outlets (No.)			
	iii) Motors (Give rating)			
	iv) Other machines (Attach list if more)			
	Item	Description	Rating	
6	Type of Earthing: TN-C/TN-S/ TN-C-S/TT/IT.			
7	LV switchboard: The board shall be checked to ascertain the following			
	i) Rating of the switchboard			
	ii) Rating of main incomer MCCB			
	iii) Form of construction (1/2B/3B/4)			
	iv) Degree of protection (IP rating)			
	v) Nameplates for identification of all circuits entering/leaving switchgear			
	vi) Proper Electrical & Mechanical operation of functional parts i.e MCCBs, Indicating meters, CTs & VTs .			
	vii) Check cable terminations, type & terminals			
	viii) General comments on the appearance of the finished mechanical assembly including welding, full nuts & tightness of bolted parts.			
8	Fireman's switch.			
	i) Make and manufacturer			
	ii) The rating of the switch			
	iii) Test for the Electrical and Mechanical operation of the switch			
	iv) State the types of loads supported by the maintained board on the switch.			
	** see foot note			

STATEMENT OF COMPLIANCE

- (a) I confirm compliance with all clauses in this tender specification.
- (b) I confirm that I have not and will not make any payment to any person which can be perceived as in inducement to enable me win this tender.

Signed.....for and on behalf of the Tenderer.

Date