

INVITATION FOR TENDER
JUNE 2012
TENDER REF. NO. KRC/2012/158

TENDER NAME: SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS AT RE INSURANCE, KISUMU.

1. The KENYA REINSURANCE CORPORATION LTD invites sealed tenders from eligible candidates for SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS AT RE INSURANCE, KISUMU , TENDER NO KRC/2012/158

2. Interested eligible candidates may obtain further information from and inspect the tender documents at Kenya Re website www.kenyare.co.ke.

3. A complete set of tender documents may be obtained from the website by all interested candidates. A non refundable handling fee of Ksh 3000/= in form of a Bankers cheque must be enclosed in the tender documents during submission. The Bankers Cheque should be raised in favour of Kenya Reinsurance Corporation Ltd.

4. Prices quoted should be net inclusive of all taxes, and delivery costs, must be in Kenya Shillings and shall remain valid for 120 days from the closing date of the tender.

5. Completed tender documents are to be enclosed in plain sealed envelopes, marked with the tender number and name and be deposited in the Tender Box at 16th Floor Reinsurance Plaza , Aga Khan Walk Nairobi or be addressed to

Managing Director
Kenya Reinsurance Corporation, Ltd
Reinsurance Plaza, Nairobi
Aga Khan Walk
P.O. Box 30271 - 00100
NAIROBI

so as to be received on or before **13th July 2012** at 10.00 am

6. Tenders will be opened immediately thereafter in the presence of the candidates representatives who choose to attend at the Corporations boardroom located at 16th Floor of the same building.

7. The tender security shall be **2 per** cent of the tender price and shall be in the form of

- a) A bank guarantee.
- b) An Insurance bond issued by an insurance firm approved by PPOA.
- c) An irrevocable letter of credit issued by a reputable bank.

8. Tenderers are required to attend a site visit on any working day(Monday to Friday) from 9.00 am to 5.00 pm. A representative of the corporation will be on site to sign all site visits forms attached in this tender documents. The signed site visit form should be forwarded alongside the completed tender document.



KENYA REINSURANCE CORPORATION LTD

CONTRACT CONDITIONS SPECIFICATIONS AND BILLS OF QUANTITIES FOR

SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS AT RE INSURANCE, KISUMU.

TENDER No. KRC/2012/158

Employer:

Kenya Reinsurance Corporation Ltd,
P. O. Box 30271-00100
NAIROBI.

Consultants

Feradon Associates Ltd.
Consulting Engineers
P.O. Box 7375-00300
NAIROBI

JUNE 2012

KENYA REINSURANCE CORPORATION LTD

CONTRACT FOR SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU

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**Feradon Associates Ltd.
Consulting Engineers
P O Box 7375-00300
NAIROBI.**

June, 2012

KENYA REINSURANCE CORPORATION LTD

CONTRACT FOR SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU

SPECIAL NOTES FOR ALL TENDERERS:

Important: The site for the proposed works has a number of existing installations. The contractor will be required to ensure there's no interference with supply of services to neighbouring organizations. The contractor will be required to take all precaution and care so that no damage will occur to the existing installations on site. The contractor is also advised to secure all the necessary insurance policies as he will be solely held responsible for any damages to the existing system, injuries to persons resulting from his activities and/or interference with normal operations of the building that may result from his negligence, actions or otherwise.

1. These notes shall form part of these specifications and conditions.
2. The tenderer is required to check the number of pages in this document and should any be found to be missing or the figures indistinct, he must inform the Engineers at once and have the same rectified. Should the tenderer be in doubt about the precise meaning of any item, word or figures, or for any reason whatsoever observe any apparent omission of words or figures, he must inform the Engineer in order that the correct meaning may be decided upon before the date for the submission of the tenders.
3. No liability whatsoever will be admitted nor claim allowed in respect of errors in the completed tender due to mistakes in this document which should have been rectified in the manner described above.
4. The tenderer shall not alter or otherwise qualify the text of this specification. Any alteration or qualification made without authority will be ignored and the text of the specification as printed will be adhered to.
5. The tenderer shall be deemed to have made allowances in his unit prices generally to cover items of preliminaries or additions to Prime cost Sums or other items, if those have not been priced against the respective items.
6. The tenderer's price shall include all government taxes including duties, V.A.T. etc. No claims whatsoever will be allowed in respect of duties, VAT etc if the tenderer fails to include them in his unit prices. It is also to be noted that VAT will be included in the unit rates and NOT worked out as a percentage of the total.
7. In no case will any expenses incurred by the tenderer in preparation of this tender be reimbursed.
8. The copyright of this specification is vested in the Engineers and no part thereof may be reproduced without their express permission, given in writing.
9. The specifications must be priced in Kenya Currency i.e. Shillings and Cents.
10. All the tenderers must make a declaration that they have not and will not make any payment to any person which can be perceived as an inducement to enable them to win this tender.
11. The works shall be carried out in accordance with provisions of the 17th Edition of IEE wiring Regulations, the most current Kenya Standards governing such works, and relevant provisions of the current Kenya Power by-laws.

Signed (As in Tender) Date/Stamp

FORM OF TENDER

**To: The Managing Director
Kenya Reinsurance Corporation Ltd.
P.O. Box 30271-00100
NAIROBI**

**KENYA REINSURANCE CORPORATION LTD
CONTRACT FOR SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY
GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA,
KISUMU**

1. In accordance with the Instructions to Tenderers, Conditions of Contract described or inferred to from the Kenya Association of Building and Civil Engineer Contractors (KABCEC), Form of Contract Agreement, Specifications, Drawings and Bills of Quantities for the execution of the above named Works, we, the undersigned offer to construct, install and complete such Works and remedy any defects therein for the sum of:

Kshs.....*[Amount in figures]*

Kenya Shillings.....*[Amount in words]*

Our anticipated contract period will be _____ weeks from the official/certified date of commencement.

2. We undertake, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Employer’s Representative’s notice to commence, and to phase the works in accordance with the building programme and to complete the whole of the works within the time of the main contract.
3. We agree to abide by this tender for 120 days from the date of official tender opening, and shall remain binding upon us and may be accepted at any time before that date.
4. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us and the Client Contractor.
5. We understand that you are not bound to accept the lowest or any tender you may receive.
6. We submit the Name of as Surety who has signed the form attached and is willing to be bound to the Client in an amount equal to 10% of the contract amount for the due performance of the contract upto the date of completion of the works and who will when and if called upon sign a Bond to the offset without limitations on the same day as the contract Agreement is signed but in the event the surety name is not approved we agree to furnish within 7 days another surety to your approval.
7. We agree in the event of your acceptance of this Tender, to execute the formal contract Agreement within Fourteen (14) days from notification of acceptance.

Dated this day of20.....

Signature Name

In the capacity ofduly authorized to sign tenders for and on behalf of:

.....*[Name of Tenderer]*

of.....*[Address of Tenderer]*

PIN No.VAT CERTIFICATE No.

Witness: Name

Address

Signature

NB: Tenderers are required to attach the surety undertaking, dully signed by the surety, to this Form of Tender.

**To: The Managing Director
Kenya Reinsurance Corporation Ltd.
P.O. Box 30271-00100
NAIROBI**

Sirs,

FORM OF UNDERTAKING

We _____

of _____, being a duly registered Commercial Bank in Kenya, are willing to act as Surety and to be bound to (Client) in the sum equal to Ten percent (10%) of the Contract Sum, for the due performance by

_____ (Tenderer)

of _____

of a Contract which he/they contemplate(s) entering into with the Client for the supply, installation, testing and commissioning of a New 300 KVA Sound-Proofed Generator Set and the Associated Ancillary Works at Reinsurance Plaza, Kisumu as described in this document, and the accompanying relevant drawings for Kenya Reinsurance Corporation Ltd according to the terms of the Performance Bank Guarantee a copy of which has been inspected by us without addition of any limitations.

We agree to enter into a Bank Guarantee under the above mentioned terms when and if called upon to do so.

Signature _____ (Surety)

Date _____

Witness _____

***To be completed by proposed Surety
and returned with Tender Documents.***

DEFINITIONS

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

The Employer
Kenya Reinsurance Corporation Ltd
P O Box 30271-00100
NAIROBI.

Consultants
Feradon Associates Ltd.
Consulting Engineers
P.O. Box 7375-00300
NAIROBI.

Employers Representative
Feradon Associates Ltd.
Consulting Engineers
P.O. Box 7375-00300
NAIROBI.

PART A:
INSTRUCTIONS TO TENDERERS

INSTRUCTIONS TO TENDERERS

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INSTRUCTION TO TENDERERS

Note: The tenderer must comply with the following conditions and instructions and failure to do so is liable to result in rejection of the tender.

GENERAL

1. Definitions

- (a) **“Tenderer”** means any person or persons partnership firm or company submitting a sum or sums in the Bills of Quantities in accordance with the Instructions to Tenderers, Conditions of Contract, Specifications, Drawings and Bills of Quantities for the work contemplated, acting directly or through a legally appointed representative.
- (b) **“Approved tenderer,”** means the tenderer who is approved by the Employer.
- (c) Any noun or adjective derived from the word **“tender”** shall be read and construed to mean the corresponding form of the noun or adjective **“bid”**. Any conjugation of the verb “tender” shall be read and construed to mean the corresponding form of the verb “bid.”
- (d) **“Employer”** means **Kenya Reinsurance Corporation Ltd, P O Box 30271-00100, Nairobi, and Tel: 2240188**

2. Eligibility and Qualification Requirements

- 2.1 This invitation to tender is open to all tenderers who have been pre-qualified.
- 2.2 To be eligible for award of Contract, the tenderer shall provide evidence satisfactory to the Employer of their eligibility under Sub clause 2.1 above and of their capability and adequacy of resources to effectively carry out the subject Contract. To this end, the tenderer shall be required to update the following information already submitted during pre-qualification:-
 - (a) Details of experience and past performance of the tenderer on the works of a similar nature within the past five years and details of current work on hand and other contractual commitments.
 - (b) The qualifications and experience of key personnel proposed for administration and execution of the contract, both on and off site.
 - (c) Major items of construction plant and equipment proposed for use in carrying out the Contract. Only reliable plant in good working order and suitable for the work required of it shall be shown on this schedule. The tenderer will also indicate on this schedule when each item will be available on the Works. Included also should be a schedule of plant, equipment and material to be imported for the purpose of the Contract, giving details of make, type, origin and CIF value as appropriate.
 - (d) Details of subcontractors to whom it is proposed to sublet any portion of the Contract and for whom authority will be requested for such subletting.
 - (e) A draft Program of Works in the form of a bar chart and Schedule of Payment which shall form part of the Contract if the tender is accepted. Any change in the Program or Schedule shall be subjected to the approval of the Engineer. The program of works must be presented in detail, to include all milestones from commencement to commissioning, and handing over.
 - (f) Details of any current litigation or arbitration proceedings in which the Tenderer is involved as one of the parties.

2.3 Joint Ventures

Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements:-

- (a) The tender, and in case of a successful tender, the Form of Agreement, shall be signed so as to be legally binding on all partners.
- (b) One of the partners shall be nominated as being in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners.
- (c) The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the Contract including payment shall be done exclusively with the partner in charge.
- (d) All partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Form of Tender and the Form of Agreement (in case of a successful tender).
- (e) A copy of the agreement entered into by the joint venture partners shall be submitted with the tender.

3. Cost of Tendering

The tenderer shall bear all costs associated with the preparation and submission of his tender and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

4. Site Visit

- 4.1 The tenderer is advised to visit and examine the Site and its surroundings and obtain for himself on his own responsibility, all information that may be necessary for preparing the tender and entering into a Contract. The costs of visiting the Site shall be the tenderer's own responsibility.
- 4.2 The tenderer and any of his personnel or agents will be granted permission by the Employer to enter upon premises and lands for the purpose of such inspection, but only upon the express condition that the tenderer, his personnel or agents, will release and indemnify the Employer from and against all liability in respect of, and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused, which but for the exercise of such permission, would not have arisen.
- 4.3 The Employer shall organize a site visit at a date to be notified. A representative of the Employer will be available to meet the intending tenderers at the Site.

Tenderers must provide their own transport. The representative will not be available at any other time for site inspection visits.

Each tenderer shall complete the Certificate of Tenderer's Visit to the Site, provided on page I13

TENDER DOCUMENTS

5. Tender Documents

5.1 The Tender documents comprise the documents listed herebelow and should be read together with any Addenda issued in accordance with Clause 7 of these instructions to tenderers.

- a. Special Notes for all Tenderers
- b. Form of Tender
- c. Form of Undertaking
- d. Definitions
- e. Instructions to Tenderers
- f. Conditions of Contract
- g. Preliminaries and General Conditions
- h. General Specifications for Electrical Installations
- i. Technical specifications for the Generator
- j. Appendices to the Technical Specifications
- k. Bills of Quantities & Schedule of Unit Rates
- l. Technical Schedule of Items to be Supplied
- m. Standard Forms

5.2 The tenderer is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the tender documents. Failure to comply with the requirements for tender submission will be at the Tenderer's own risk. Pursuant to clause 23 of Instructions to Tenderers, tenders which are not substantially responsive to the requirements of the tender documents will be rejected.

5.3 All recipients of the documents for the proposed Contract for the purpose of submitting a tender (whether they submit a tender or not) shall treat the details of the documents as "private and confidential".

6. Clarification of Tender Documents

6.1 A prospective tenderer requiring any clarification of the tender documents may notify the Employer in writing or by telex, cable or facsimile at the Employer's mailing address indicated in the Invitation to Tender. The Employer will respond in writing to any request for clarification, which he receives earlier than 7 days prior to the deadline for the submission of tenders. Written copies of the Employer's response (including the query but without identifying the source of the inquiry) will be sent to all prospective tenderers who have purchased the tender documents.

7. Amendment of Tender Documents

7.1 At any time prior to the deadline for submission of tenders the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective tenderer, modify the tender documents by issuing Addenda.

7.2 Any Addendum will be notified in writing or by cable, telex or facsimile to all prospective tenderers who have purchased the tender documents and will be binding upon them.

7.3 If during the period of tendering, any circular letters (tender notices) shall be issued to tenderers by, or on behalf of, the Employer setting forth the interpretation to be placed on a part of the tender documents or to make any change in them, such circular letters will form part of the tender documents and it will be assumed that the tenderer has taken account of them in preparing his tender. The tenderer must promptly acknowledge any circular letters he may receive.

- 7.4 In order to allow prospective tenderers reasonable time in which to take the Addendum into account in preparing their tenders, the Employer may, at his discretion, extend the deadline for the submission of tenders.

PREPARATION OF TENDERS

8. Language of Tender

- 8.1 The tender and all correspondence and documents relating to the tender exchanged between the tenderer and the Employer shall be written in the English language. Supporting documents and printed literature furnished by the tenderer with the tender may be in another language provided they are accompanied by an appropriate translation of pertinent passages in the above stated language. For the purpose of interpretation of the tender, the English language shall prevail.

9. Documents Comprising the Tender

- 9.1 The tender to be prepared by the tenderer shall comprise: the Form of Tender and Appendix thereto, a Tender Surety, the Priced Bills of Quantities and Schedules, the information on eligibility and qualification, and any other materials required to be completed and submitted in accordance with the Instructions to Tenderers embodied in these tender documents. The Forms, Bills of Quantities and Schedules provided in the tender documents shall be used without exception (subject to extensions of the schedules in the same format and to the provisions of clause 13.2 regarding the alternative forms of Tender Surety).

10. Tender Prices

- 10.1 All the insertions made by the tenderer shall be made in INK and the tenderer shall clearly form the figures. The relevant space in the Form of Tender and Bills of Quantities shall be completed accordingly without interlineations or erasures except those necessary to correct errors made by the tenderer in which case the erasures and interlineations shall be initialed by the person or persons signing the tender.
- 10.2 The tenderer for every item in the Bills of Quantities shall insert a price or rate whether the quantities are stated or not. Items against which no rate or price is entered by the tenderer will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bills of Quantities.

The prices and unit rates in the Bills of Quantities are to be the full [all-inclusive] value of the work described under the items, including all costs and expenses which may be necessary and all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based. All duties and taxes and other levies payable by the Contractor under the Contract or for any other cause as of the date 7 days prior to the deadline for the submission of tenders, shall be included in the rates and prices and the total tender prices submitted by the Tenderer. Such duties to include import duty, Value Added Tax (VAT), local authority (levies) and any other taxes (levies that may be imposed by the government and/or local authorities.

Each price or unit rate inserted in the Bills of Quantities should be a realistic estimate for completing the activity or activities described under that particular item and the tenderer is advised against inserting a price or rate against any item contrary to this instruction.

Every rate entered in the Bills of Quantities, whether or not such rate be associated with a quantity, shall form part of the Contract. The Employer shall have the right to call for any item of work contained in the Bills of Quantities, and such items of work to be paid for at the rate entered by the tenderer and it is the intention of the Employer to take full advantage of unbalanced low rates.

- 10.3 Unless otherwise specified the tenderer must enter the amounts representing 10% of the sub-total of the summary of the Bills of Quantities for Contingencies and Variation of Prices [V.O.P.] payments in the summary sheet and add them to the sub-total to arrive at the tender amount.
- 10.4 The tenderer shall furnish with his tender written confirmation from his suppliers or manufacturers of unit rates for the supply of items listed in the Conditions of Contract where appropriate.
- 10.5 The rates and prices quoted by the tenderer are subject to adjustment during the performance of the Contract only in accordance with the provisions of the Conditions of Contract. The tenderer shall complete the schedule of basic rates and shall submit with his tender such other supporting information as required under the Conditions of Contract.

11. Currencies of Tender and Payment

- 11.1 Tenders shall be priced in Kenya Shillings and the tender sum shall be in Kenya Shillings.
- 11.2 Tenderers are required to indicate in the Statement of Foreign Currency Requirements, which forms part of the tender, the foreign currency required by them. Such currency should generally be the currency of the country of the Tenderer's main office. However, if a substantial portion of the Tenderer's expenditure under the Contract is expected to be in countries other than his country of origin, then he may state a corresponding portion of the Contract price in the currency of those other countries. However, the foreign currency element is to be limited to two (2) different currencies and a maximum of 30% (thirty percent) of the Contract Price.
- 11.3 The rate of exchange used for pricing the tender shall be selling rate or rates of the Central Bank ruling on the date seven (7) days before the final date for the submission of tenders.
- 11.4 Tenderers must enclose with their tenders, a brief justification of the foreign currency requirements stated in their tenders.

12. Tender Validity

- 12.1 The tender shall remain valid and open for acceptance for a period of one hundred and twenty (120) days from the specified date of tender opening or from the extended date of tender opening (in accordance with clause 7.4 here above) whichever is the later.
- 12.2 In exceptional circumstances prior to expiry of the original tender validity period, the Employer may request the tenderer for a specified extension of the period of validity. The request and the responses thereto shall be made in writing or by cable, telex or facsimile. A tenderer may refuse the request without forfeiting his Tender Surety. A tenderer agreeing to the request will not be required nor permitted to modify his tender, but will be required to extend the validity of his Tender Surety correspondingly.

13. Tender Surety

- 13.1 The tenderer shall furnish as part of his tender, a Tender Surety in the amount stated in the Appendix to Instructions to Tenderers.
- 13.2 The unconditional Tender Surety shall be in Kenya Shillings and be in form of a certified cheque, a bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank approved by the Employer located in the Republic of Kenya.

The format of the Surety shall be in accordance with the sample form of Tender Surety included in these tender documents; other formats may be permitted subject to the prior approval of the Employer. The Tender Surety shall be valid for twenty-eight (28) days beyond the tender validity period.

- 13.3 Any tender not accompanied by an acceptable Tender Surety will be rejected by the Employer as non-responsive.
- 13.4 The Tender Sureties of unsuccessful tenderers will be returned as promptly as possible but not later than twenty eight (28) days after concluding the Contract execution and after a Performance Security has been furnished by the successful tenderer. The Tender Surety of the successful tenderer will be returned upon the tenderer executing the Contract and furnishing the required Performance Security.
- 13.5 The Tender Surety may be forfeited:
- (a) if a tenderer withdraws his tender during the period of tender validity:or
 - (b) in the case of a successful tenderer, if he fails
 - (i) to sign the Agreement, or
 - (ii) to furnish the necessary Performance Security
 - (c) if a tenderer does not accept the correction of his tender price pursuant to clause 24.

14. No Alternative Offers

- 14.1 The tenderer shall submit an offer, which complies fully with the requirements of the tender documents.

Only one tender may be submitted by each tenderer either by himself or as partner in a joint venture.

- 14.2 The tenderer shall not attach any conditions of his own to his tender. The tender price must be based on the tender documents. The tenderer is not required to present alternative construction options and he shall use without exception, the Bills of Quantities as provided, with the amendments as notified in tender notices, if any, for the calculation of his tender price.

Any tenderer who fails to comply with this clause will be disqualified.

15 Pre-Tender Meeting

- 15.1 The tenderer's designated representative is invited to attend a pre-tender meeting, which if convened, will take place at the venue and time stated in the Invitation to Tender. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 15.2 The tenderer is requested as far as possible to submit any questions in writing or by cable, to reach the Employer not later than seven days before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted in accordance with the following:
- (a) Minutes of the meeting, including the text of the questions raised and the responses given together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the tender documents. Any modification of the tender documents listed in --Clause 9 which may become necessary as a result of the pre-tender meeting shall be made by the Employer exclusively through the issue of a tender notice pursuant to Clause 7 and not through the minutes of the pre-tender meeting.

- (b) Non attendance at the pre-tender meeting will not be cause for disqualification of a bidder.

16 Format and Signing of Tenders

- 16.1 The tenderer shall prepare his tender as outlined in clause 9 above and mark appropriately one set "ORIGINAL" and the other "COPY".
- 16.2 The copy of the tender and Bills of Quantities shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the tenderer. Proof of authorization shall be furnished in the form of the written power of attorney, which shall accompany the tender. All pages of the tender where amendments have been made shall be initialed by the person or persons signing the tender.
- 16.3 The complete tender shall be without alterations, interlineations or erasures, except as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person or persons signing the tender.

SUBMISSION OF TENDERS

17 Sealing and Marking of Tenders

- 17.1 The tenderer shall seal the original and copy of the tender in separated envelopes, duly marking the envelopes as "ORIGINAL" and "COPY". The envelopes shall then be sealed in an outer envelope.
- 17.2 The inner and outer envelopes shall be addressed to the Employer at the address stated in the Appendix to Instructions to Tenderers and bear the name and identification of the Contract stated in the said Appendix with a warning not to open before the date and time for opening of tenders stated in the said Appendix.
- 17.3 The inner envelopes shall each indicate the name and address of the tenderer to enable the tender to be returned unopened in case it is declared "late", while the outer envelope shall bear no mark indicating the identity of the tenderer.
- 17.4 If the outer envelope is not sealed and marked as instructed above, the Employer will assume no responsibility for the misplacement or premature opening of the tender. A tender opened prematurely for this cause will be rejected by the Employer and returned to the tenderer.

18. Deadline for Submission of Tenders

- 18.1 Tenders must be received by the Employer at the address specified in clause 17.2 and on the date and time specified in the Letter of Invitation, subject to the provisions of clause 7.4, 18.2 and 18.3.

Tenders delivered by hand must be placed in the "tender box" provided in the office of the Employer.

Proof of posting will not be accepted as proof of delivery and any tender delivered after the above stipulated time, from whatever cause arising will not be considered.

- 18.2 The Employer may, at his discretion, extend the deadline for the submission of tenders through the issue of an Addendum in accordance with clause 7, in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline shall thereafter be subject to the new deadline as extended.
- 18.3 Any tender received by the Employer after the prescribed deadline for submission of tender will be returned unopened to the tenderer.

Modification and Withdrawal of Tenders

- 18.4 The tenderer may modify or withdraw his tender after tender submission, provided that written notice of the modification or withdrawal is received by the Employer prior to prescribed deadline for submission of tenders.
- 18.5 The Tenderer's modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions for the submission of tenders, with the inner and outer envelopes additionally marked "MODIFICATION" or "WITHDRAWAL" as appropriate.
- 18.6 No tender may be modified subsequent to the deadline for submission of tenders.
- 18.7 No tender may be withdrawn in the interval between the deadline for submission of tenders and the period of tender validity specified on the tender form. Withdrawal of a tender during this interval will result in the forfeiture of the Tender Surety.
- 18.8 Subsequent to the expiration of the period of tender validity prescribed by the Employer, and the tenderer having not been notified by the Employer of the award of the Contract or the tenderer does not intend to conform with the request of the Employer to extend the prior of tender validity, the tenderer may withdraw his tender without risk of forfeiture of the Tender Surety.

TENDER OPENING AND EVALUATION

19 Tender Opening

- 19.1 The Employer will open the tenders in the presence of the tenderers' representatives who choose to attend at the time and location indicated in the Letter of Invitation to Tender. The tenderers' representatives who are present shall sign a register evidencing their attendance.
- 19.2 Tenders for which an acceptable notice of withdrawal has been submitted, pursuant to clause 19, will not be opened. The Employer will examine the tenders to determine whether they are complete, whether the requisite Tender Sureties have been furnished, whether the documents have been properly signed and whether the tenders are generally in order.
- 19.3 At the tender opening, the Employer will announce the Tenderer's names, total tender price, tender price modifications and tender withdrawals, if any, the presence of the requisite Tender Surety and such other details as the Employer, at his discretion, may consider appropriate. No tender shall be rejected at the tender opening except for late tenders.
- 19.4 The Employer shall prepare minutes of the tender opening including the information disclosed to those present.
- 19.5 Tenders not opened and read out at tender opening shall not be considered further for evaluation, irrespective of the circumstances.

20 Process to be Confidential

- 20.1 After the public opening of tenders, information relating to the examination, clarification, evaluation and comparisons of tenders and recommendations concerning the award of Contract shall not be disclosed to tenderers or other persons not officially concerned with such process until the award of Contract is announced.
- 21.2 Any effort by a tenderer to influence the Employer in the process of examination, evaluation and comparison of tenders and decisions concerning award of Contract may result in the rejection of the Tenderer's tender.

21 Clarification Tenders

- 21.1 To assist in the examination, evaluation and comparison of tenders, the Employer may ask tenderers individually for clarification of their tenders, including breakdown of unit prices. The request for clarification and the response shall be in writing or by cable, facsimile or telex, but no change in the price or substance of the tender shall be sought, offered or permitted except as required to confirm the correction of arithmetical errors discovered by the employer during the evaluation of the tenders in accordance with clause 24.
- 21.2 No Tenderer shall contact the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. If the tenderer wishes to bring additional information to the notice of the Employer, he shall do so in writing.

22 Determination of Responsiveness

- 22.1 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender is substantially responsive to the requirements of the tender documents.
- 22.2 For the purpose of this clause, a substantially responsive tender is one, which conforms to all the terms, conditions and specifications of the tender documents without material deviation or reservation and has a valid bank guarantee. A material deviation or reservation is one which affects in any substantial way the scope, quality, completion timing or administration of the Works to be undertaken by the tenderer under the Contract, or which limits in any substantial way, inconsistent with the tender documents, the Employer's rights or the tenderers obligations under the Contract and the rectification of which would affect unfairly the competitive position of other tenderers who have presented substantially responsive tenders.
- 22.3 Each price or unit rate inserted in the Bills of Quantities shall be a realistic estimate of the cost of completing the works described under the particular item including allowance for overheads, profits and the like. Should a tender be seriously unbalanced in relation to the Employer's estimate of the works to be performed under any item or groups of items, the tender shall be deemed not responsive.
- 22.4 A tender determined to be not substantially responsive will be rejected by the Employer and may not subsequently be made responsive by the tenderer by correction of the non-conforming deviation or reservation.

23 Correction of Errors

Tenders determined to be substantially responsive shall be checked by the Employer for any arithmetic errors in the computations and summations. Errors will be corrected by the Employer as follows:

- (a) Where there is a discrepancy between the amount in figures and the amount in words, the amount in words will govern.
- (b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there is an obvious typographical error, in which case adjustment will be made to the entry containing that error.

- (c) The amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and, with concurrence of the tenderer, shall be considered as binding upon the tenderer. If the tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security may be forfeited in accordance with clause 13.

24 Conversion to Single Currency

- 24.1 For compensation of tenders, the tender price shall first be broken down into the respective amounts payable in various currencies by using the selling rate or rates of the Central Bank of Kenya ruling on the date seven (7) days before the final date for the submission of tenders.
- 24.2 The Employer will convert the amounts in various currencies in which the tender is payable (excluding provisional sums but including Day-works where priced competitively) to Kenya Shillings at the selling rates stated in clause 25.1.

25 Evaluation and Comparison of Tenders

- 25.1 The Employer will evaluate only tenders determined to be substantially responsive to the requirements of the tender documents in accordance with clause 23.
- 25.2 In evaluating tenders, the Employer will determine for each tender the evaluated tender price by adjusting the tender price as follows:
 - (a) Making any correction for errors pursuant to clause 24.
 - (b) Excluding Provisional Sums and provision, if any, for Contingencies in the Bills of Quantities, but including Day works where priced competitively.
- 25.3 The Employer reserves the right to accept any variation, deviation or alternative offer. Variations, deviations, alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in the accrual of unsolicited benefits to the Employer, shall not be taken into account in tender evaluation.
- 25.4 Price adjustment provisions in the Conditions of Contract applied over the period of execution of the Contract shall not be taken into account in tender evaluation.
- 25.5 If the lowest evaluated tender is seriously unbalanced or front loaded in relation to the Employer's estimate of the items of work to be performed under the Contract, the Employer may require the tenderer to produce detailed price analyses for any or all items of the Bills of Quantities, to demonstrate the relationship between those prices, proposed construction methods and schedules. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in clause 29 be increased at the expense of the successful tenderer to a level sufficient to protect the Employer against financial loss in the event of subsequent default of the successful tenderer under the Contract.
- 25.6 Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital shall be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding Provisional Sums to a non-indigenous sub-contractor.

AWARD OF CONTRACT

26 Award

- 26.1 Subject to clause 27.2, the Employer will award the Contract to the tenderer whose tender is determined to be substantially responsive to the tender documents and who has offered the lowest evaluated tender price subject to possessing the capability and resources to effectively carry out the Contract Works.
- 26.2 The Employer reserves the right to accept or reject any tender, and to annul the tendering process and reject all tenders, at any time prior to award of Contract, without thereby incurring any liability to the affected tenderers or any obligation to inform the affected tenderers of the grounds for the Employer's action.

27 Notification of Award

- 27.1 Prior to the expiration of the period of tender validity prescribed by the Employer, the Employer will notify the successful tenderer by cable, telefax or telex and confirmed in writing by registered letter that his tender has been accepted. This letter (hereinafter and in all Contract documents called "Letter of Acceptance") shall name the sum (hereinafter and in all Contract documents called "the Contract Price") which the Employer will pay to the Contractor in consideration of the execution and completion of the Works as prescribed by the Contract.
- 27.2 Notification of award will constitute the formation of the Contract.
- 27.3 Upon the furnishing of a Performance Security by the successful tenderer, the unsuccessful tenderers will promptly be notified that their tenders have been unsuccessful.
- 27.4 Within Fourteen [14] days of receipt of the form of Contract Agreement from the Employer, the successful tenderer shall sign the form and return it to the Employer together with the required Performance Security.

28 Performance Guarantee

- 28.1 Within Fourteen [14] days of receipt of the notification of award from the Employer, the successful tenderer shall furnish the Employer with a Performance Security in an amount stated in the Appendix to Instructions to Tenderers.
- 28.2 The Performance Security to be provided by the successful tenderer shall be an unconditional Bank Guarantee issued at the Tenderer's option by an established and a reputable Bank approved by the Employer and located in the Republic of Kenya and shall be divided into two elements namely, a performance security payable in foreign currencies and a performance security payable in Kenya Shillings. The value of the two securities shall be in the same proportions of foreign and local currencies as requested in the form of foreign currency requirements.
- 28.3 Failure of the successful tenderer to lodge the required Performance Security shall constitute a breach of Contract and sufficient grounds for the annulment of the award and forfeiture of the Tender Security and any other remedy under the Contract. The Employer may award the Contract to the next ranked tenderer.

29 Advance Payment

An advance payment, if approved by the Employer, shall be made under the Contract, if requested by the Contractor. The Advance Payment Guarantee shall be denominated in the proportion and currencies named in the form of foreign currency requirements. For each currency, a separate guarantee shall be issued. The guarantee shall be issued by a bank located in the Republic of Kenya, or a foreign bank through a correspondent bank located in the Republic of Kenya, in either case subject to the approval of the Employer.

APPENDIX TO INSTRUCTIONS TO TENDERERS

1. CLAUSE 2.1

Change to read “This invitation Tender is open to all tenderers in the Category Specified”.

2. OMIT

Clauses 2.3, 4.3, 5.1 (a), (d), (f),(h), (i), (j), 11.2, 11.4, 25, 14.1, 13.1, 13.3, 13.4, 13.5, 15.1, 15.2

3. ADD TO CLAUSE 13.1 and 13.2

Tender surety will be required and the Tender Security to shall be as indicated in Letter of Invitation.

4. CLAUSES 16.1 and 16.2

Only one set of tender document shall be submitted.

5. CLAUSES 6.1 AND 10.2

Change to 7 days (1 week)

6. CLAUSE 9.1

Appendix to Form of Tender to be omitted.

7. CLAUSE 19.2

Only the single tender document should be marked “WITHDRAWAL” OR “MODIFICATION”

8. CLAUSES 20.2, 20.3, AND 24(C)

Tender surety will be required.

9. CLAUSE 30

The Advance Payment Guarantee shall be in Kenya Shillings Only.

10. CLAUSE 16.1, 16.2, 17.1, and 17.2

Only one set of tender documents, filled in INK, shall be submitted.

11. ADD TO CLAUSE 28.1

Amount of performance security will be as indicated in the Letter of Invitation.

12. ADD TO CLAUSE 28.2

Performance security shall not be divided in two elements and shall be payable in Kenya Shillings Only.

TENDER EVALUATION CRITERIA

After tender opening, the tenders will be evaluated in 4 stages, namely:

1. Determination of Responsiveness (Mandatory Requirements)
2. Detailed Technical Examination
3. Financial Evaluation.
4. Combination of Technical Score and Financial Score

STAGE 1- DETERMINATION OF RESPONSIVENESS

This stage of evaluation shall involve examination of the pre-qualification conditions 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 may include the following:

- i) Registration with Ministry of Public Works
- ii) Certificate of Registration under Company's Act
- iii) Class of Licenses with the relevant statutory bodies e.g. Energy Regulatory Commission, Local Authorities, Water Management Boards etc.
- iv) Provision of Bid Security of Ksh. 200,000.00 from a reputable Bank
- v) Dully filled Form of Tender
- vi) Tax Compliant Certificate
- vii) Any other conditions included in the advertisement notice/Invitation letter.

Note:

The bid security shall be in accordance with clauses 13 and 23.2 of Instruction to Tenderers which states as follows:

- **Clause 13.1** of Instruction to Tenderers, "the tenderers shall furnish as part of his tenders a tender surety in the amount stated in the tender document in the Appendix to Instructions to Tenderers".
- **Clause 13.2** of Instruction to Tenderers, "the unconditional Tender surety shall be in Kenya shillings and be in form of a certified cheque, bank draft, an irrevocable letter of credit or a guarantee from a reputable Bank located in the Republic of Kenya. The format of the surety shall be in accordance with the sample form included in the tender documents and the tender surety shall be valid for **150 days** from the date of tender opening".
- **Clause 23.2** of Instruction to Tenderers: "For the purposes of this clause, a substantially responsive tender is one which conforms to all terms and condition and specifications of the tender document without material deviation or reservation and has a valid Bank/Insurance guarantee".

The employer may seek further clarification/confirmation if necessary to confirm authenticity/compliance of any condition of the tender.

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

STAGE 2 TECHNICAL EVALUATION

The tender document shall be examined based on clause 2.2 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.2 of Instruction to Tenderers, the tenderers will be required to provide evidence for eligibility of the award of the tender by satisfying the employer of their eligibility under sub clause 2.1 of Instruction to Tenderers and adequacy of resources to effectively carry out the subject contract. The tenderers shall be required to fill the Standards Forms provided for the purposes of providing the required information. The tenderers may also attach the required information if they so desire.

Also the bid will be analyzed to determine compliance with General and Particular technical specifications for the works as indicated in the tender document.

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

Where the Equipment proposed by the tenderer differs with the models specified in the tender document, it is mandatory that the brochures/catalogues of the same be submitted with the tender document highlighting the catalogues Numbers 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:

- a) Standards of manufacture
- b) Performance ratings/characteristics
- c) Material of manufacture
- d) Electrical power ratings and
- e) Any other necessary requirements (Specify)

The evaluation team will thoroughly scrutinize the documents to satisfy themselves that the tenderer has filled, completed and provided comprehensive and supportive documents outlining:-

1. Key personnel to execute in the works
2. Contracts completed in the last 5 years and their relevance to the contract
3. Schedule on the on going contracts and their relevance to the contract
4. Schedule of unit rates
5. Bills of Quantities

Presentation of realistic time frame for completion of the contract shall be included with the proposal and evaluated.

Following the above analyses, where the proposed equipment are found not to satisfy the specifications, the tender will be deemed Non – Responsive and will not be evaluated further.

MARKING SCHEME

The detailed scoring plan shall be as shown in table 1 below: -

TABLE 1

Item	Description	Point Scored	Max. Point	
i	Statement of Compliance Signed and stamped ----- 3 Signed but not stamped or vice versa ----- 2 Not signed nor stamped ----- 0		3	
ii	Tender Questionnaire Form Completely filled ----- 3 Partially filled ----- 2 Not filled -----0		3	
iii	Confidential Business Questionnaire Form. Completely filled ----- 4 Partially filled ----- 2 Not filled ----- 0		4	
iv	Key Personnel (Attach evidence)		20	
	Director of the firm o Holder of degree or diploma in relevant Engineering field-----5 o Holder of certificate in relevant Engineering field-----3 o Holder of trade test certificate in relevant Engineering field---2 o No relevant certificate -----0			5
	At least 1No. key personnel with minimum qualification of a degree/diploma in relevant Engineering field o With over 10 years relevant experience -----5 o With over 5 years relevant experience ----- 3 o With under 5 years relevant experience ----- 1			5
	At least 1No key personnel with minimum qualification of a certificate in relevant Engineering field o With over 10 years relevant experience ----- 5 o With over 5 years relevant experience ----- 3 o With under 5 years relevant experience -----1			5
	At least 2No artisan (with minimum trade test certificate in relevant Engineering field) o Artisan with over 10 years relevant experience ----- 5 o Artisan with under 10 years relevant experience ----- 3 o Non skilled worker with over 10 years relevant experience ----1			5

V	Contract completed in the last five (5) years (Max of 5 No. Projects) <ul style="list-style-type: none"> ○ Project of similar nature, complexity and magnitude -----10 ○ Project of similar nature but of lower value than the one in consideration----- 5 ○ No completed project of similar nature ----- 0 		10	20
Vi	On-going projects (Max of 5 No. Projects) <ul style="list-style-type: none"> ○ Project of similar nature, complexity and magnitude ----- 10 ○ Project of similar nature but of lower value than the one in consideration -----5 ○ No ongoing project of similar nature - -----0 ○ 		10	
vii	Schedule of contractors equipment and transport (proof or evidence of ownership/availability) <ul style="list-style-type: none"> ○ Means of transport (Truck) ----- 4 ○ No means of transport ----- 0 		4	10
	For each specific equipment required in the installation of the Work being tendered for. (Maximum No. of relevant equipment to be considered – 3 No.) ----- 2		6	
viii	Financial report		6	
	Audited financial report (last three (3) years) <ul style="list-style-type: none"> ○ Turn over greater or equal to 5 times the cost of the project --- 6 ○ Turn over greater or equal to 3 times the cost of the project ---- 4 ○ Turn over greater or equal to the cost of the project ----- 2 ○ Turn over below the cost of the project ----- 0 			
ix	Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc) <ul style="list-style-type: none"> ○ Has financial resources equal or above the cost of the project-- 8 ○ Has financial resources below the cost of the project -----4 ○ Has not indicated sources of financial resources -----0 		8	
x	Name, Address and Telephone of Banks (Contractor to provide) <ul style="list-style-type: none"> ○ Provided ----- 4 ○ Not provided ----- 0 		4	
xi	Litigation History (Attach proof to get marks) <ul style="list-style-type: none"> ○ Filled (attach lawyers letter confirming no litigation.....2 ○ Not filled -----0 		2	
	TOTAL		80	

Any bidder who scores below 60 points shall not be considered for further evaluation

The Technical score will be carried forward to **STAGE 4**
STAGE 3

FINANCIAL EVALUATION

This will be carried out only for those tenders that have passed BOTH The Responsiveness Evaluation and The Technical Evaluation.

The evaluation shall be in two sections

1. Preliminary examinations and
2. Tender sum Comparisons

PRELIMINARY EXAMINATIONS

The preliminary examination in the Financial Evaluation shall be in accordance with clause 26 of Instruction to Tenderers.

The parameter to be considered under this section includes the following:

- a) Arithmetic errors and comparison of rates

(1) Arithmetic Errors

The bid shall be checked for arithmetic errors based on the rates and the total sums indicated in the bills of quantities.

- a) Confirmation shall be sought in writing from the tenderers whose tender sums will be determined to have a significant arithmetic error to their disadvantage, to confirm whether they stand by their tender sums. The error shall be treated as per **clause 24 of Instructions to Tenderers**.

Non compliance with the above shall lead to **automatic disqualification from further evaluation**.

Discount if any shall be treated as an error in pursuant to **clause 26.3** of Instructions to Tenderers

(2) Comparison of rates

The evaluation committee will compare rates from different bidders and note consistency of rates and front loading. The evaluation committee will judge and make an appropriate decision giving evidence.

The formula in determining the financial score is as follows:- (The single currency for the price conversion is KENYA SHILLINGS)

$$SF = \frac{FM}{F} \times 100$$

$$SF = \text{Financial Score}$$

$$FM = \text{Lowest Financial Proposal}$$

$$F = \text{Financial Proposal under consideration.}$$

The weights given to the technical proposal (T) is 0.80 and for financial proposal (P) is 0.20.

The lowest bid will be given maximum financial score.

STAGE 4 COMBINED FINANCIAL AND TECHNICAL SCORE

The evaluation results will be ranked on Combined Financial and Technical Score which is given as follows:-

$$S = S_t \times T\% + S_f \times P\%$$

Where

$$S_t = \text{Technical Score}$$

$$T = \text{Technical Weighting}$$

$$S_f = \text{Financial Score}$$

$$P = \text{Financial Weighting}$$

$$S = \text{Combined Financial and Technical Score}$$

PART B:

CONDITIONS OF CONTRACT

CONDITIONS OF CONTRACT

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CONDITIONS OF CONTRACT

1. Definitions

1.1 In this Contract, except where context otherwise requires, the following terms shall be interpreted as indicated;

“Bills of Quantities” means the priced and completed Bill of Quantities forming part of the tender[where applicable].

“Schedule of Rates” means the priced Schedule of Rates forming part of the tender [where applicable].

“The Completion Date” means the date of completion of the Works as certified by the Employer’s Representative.

“The Contract” means the agreement entered into by the Employer and the Contractor as recorded in the Agreement Form and signed by the parties.

“The Contractor” refers to the person or corporate body whose tender to carry out the Works has been accepted by the Employer.

“The Contractor’s Tender” is the completed tendering document submitted by the Contractor to the Employer.

“The Contract Price” is the price stated in the Letter of Acceptance.

“Days” are calendar days; **“Months”** are calendar months.

“A Defect” is any part of the Works not completed in accordance with the Contract.

“The Defects Liability Certificate” is the certificate issued by Employer’s Representative upon correction of defects by the Contractor.

“The Defects Liability Period” is the period named in the Appendix to Conditions of Contract and calculated from the Completion Date.

“Drawings” include calculations and other information provided or approved by the Employer’s Representative for the execution of the Contract.

“Employer” includes Central or Local Government administration, Universities, Public Institutions and Corporations and is the party who employs the Contractor to carry out the Works.

“Equipment” is the Contractor’s machinery and vehicles brought temporarily to the Site for the execution of the Works.

“Site” means the place or places where the permanent Works are to be carried out including workshops where the same is being prepared.

“Materials” are all supplies, including consumables, used by the Contractor for incorporation in the Works.

“Employer’s Representative” is the person appointed by the Employer and notified to the Contractor for the purpose of supervision of the Works.

“Specification” means the Specification of the Works included in the Contract.

“Start Date” is the date when the Contractor shall commence execution of the Works.

“A Sub-contractor” is a person or corporate body who has a Contract with the Contractor to carry out a part of the Work in the Contract, which includes Work on the Site.

“Temporary works” are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

“A Variation” is an instruction given by the Employer’s Representative which varies the Works.

“The Works” are what the Contract requires the Contractor to construct, install, and turnover to the Employer.

2. Contract Documents

2.1 The following documents shall constitute the Contract documents and shall be interpreted in the following order of priority;

- (1) Agreement,
- (2) Letter of Acceptance,
- (3) Contractor’s Tender,
- (4) Conditions of Contract,
- (5) Specifications,
- (6) Drawings,
- (7) Bills of Quantities or Schedule of Rates [whichever is applicable)

3. Employer’s Representative’s Decisions

3.1 Except where otherwise specifically stated, the Employer’s Representative will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

4. Works, Language and Law of Contract

4.1 The Contractor shall construct and install the Works in accordance with the Contract documents. The Works may commence on the Start Date and shall be carried out in accordance with the Programme submitted by the Contractor, as updated with the approval of the Employer’s Representative, and complete them by the Intended Completion Date.

4.2 The ruling language of the Contract shall be English language and the law governing the Contract shall be the law of the Republic of Kenya.

5. Safety, Temporary works and Discoveries

5.1 The Contractor shall be responsible for design of temporary works and shall obtain approval of third parties to the design of the temporary works where required.

5.2 The Contractor shall be responsible for the safety of all activities on the Site.

5.3 Any thing of historical or other interest or significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Employer’s Representative of such discoveries and carry out the Employer’s Representative’s instructions for dealing with them.

6. Work Programme and Sub-contracting

6.1 Within seven days after Site possession date, the Contractor shall submit to the Employer's Representative for approval a programme showing the general methods, arrangements, order and timing for all the activities in the Works.

6.2 The Contractor may sub-contract the Works (but only to a maximum of 25 percent of the Contract Price) with the approval of the Employer's Representative. However, he shall not assign the Contract without the approval of the Employer in writing. Sub-contracting shall not alter the Contractor's obligations.

7. The site

7.1 The Employer shall give possession of all parts of the Site to the Contractor.

7.2 The Contractor shall allow the Employer's Representative and any other person authorised by the Employer's Representative, access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

8. Instructions

8.1 The Contractor shall carry out all instructions of the Employer's Representative which are in accordance with the Contract.

9. Extension of Completion Date

9.1 The Employer's Representative shall extend the Completion Date if an occurrence arises which makes it impossible for completion to be achieved by the Intended Completion Date. The Employer's Representative shall decide whether and by how much to extend the Completion Date.

9.2 For the purposes of this Clause, the following occurrences shall be valid for consideration;

Delay by:-

- (a) force majeure, or
- (b) reason of any exceptionally adverse weather conditions, or
- (c) reason of civil commotion, strike or lockout affecting any of the trades employed upon the Works or any of the trades engaged in the preparation, manufacture or transportation of any of the goods or materials required for the Works, or
- (d) reason of the Employer's Representative's instructions issued under these Conditions, or
- (e) reason of the contractor not having received in due time necessary instructions, drawings, details or levels from the Employer's Representative for which he specifically applied in writing on a date which having regard to the date for Completion stated in the appendix to these Conditions or to any extension of time then fixed under this Clause was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same, or
- (f) delay on the part of artists, tradesmen or others engaged by the Employer in executing work not forming part of this Contract, or
- (g) reason of delay by statutory or other services providers or similar bodies engaged directly by the Employer, or
- (h) reason of opening up for inspection of any Work covered up or of the testing or

any of the Work, materials or goods in accordance with these conditions unless the inspection or test showed that the Work, materials or goods were not in accordance with this Contract, or

- (i) reason of delay in appointing a replacement Employer's Representative, or
- (j) reason of delay caused by the late supply of goods or materials or in executing Work for which the Employer or his agents are contractually obliged to supply or to execute as the case may be, or
- (k) delay in receiving possession of or access to the Site.

10. Management Meetings

- 10.1 A Contract management meeting shall be held regularly and attended by the Employer's Representative and the Contractor. Its business shall be to review the plans for the remaining Work. The Employer's Representative shall record the business of management meetings and provide copies of the record to those attending the meeting and the Employer. The responsibility of the parties for actions to be taken shall be decided by the Employer's Representative either at the management meeting or after the management meeting and stated in writing to all who attend the meeting.
- 10.2 Communication between parties shall be effective only when in writing.

11. Defects

- 11.1 The Employer's Representative shall inspect the Contractor's work and notify the Contractor of any defects that are found. Such inspection shall not affect the Contractor's responsibilities. The Employer's Representative may instruct the Contractor to search for a defect and to uncover and test any Work that the Employer's Representative considers may have a defect. Should the defect be found, the cost of uncovering and making good shall be borne by the Contractor. However, if there is no defect found, the cost of uncovering and making good shall be treated as a variation and added to the Contract Price.
- 11.2 The Employer's Representative shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Appendix to Conditions of Contract.
- 11.3 Every time notice of a defect is given, the Contractor shall correct the notified defect within the length of time specified by the Employer's Representative's notice. If the Contractor has not corrected a defect within the time specified in the Employer's Representative's notice, the Employer's Representative will assess the cost of having the defect corrected by other parties and such cost shall be treated as a variation and be deducted from the Contract Price.

12. Bills of Quantities/Schedule of Rates

- 12.1 The Bills of Quantities/Schedule of Rates shall contain items for the construction, installation, testing and commissioning of the Work to be done by the Contractor. The Contractor will be paid for the quantity of the Work done at the rates in the Bills of Quantities/Schedule of Rates for each item. Items against which no rate is entered by the Tenderer will not be paid for when executed and shall be deemed covered by the rates for other items in the Bills of Quantities/Schedule of Rates.
- 12.2 Where Bills of Quantities do not form part of the Contract, the Contract Price shall be a lump sum (which shall be deemed to have been based on the rates in the Schedule of Rates forming part of the tender) and shall be subject to re-measurement after each stage.

13. Variations

- 13.1 The Contractor shall provide the Employer's Representative with a quotation for carrying out the variations when requested to do so. The Employer's Representative shall assess the quotation and shall obtain the necessary authority from the Employer before the variation is ordered.
- 13.2 If the Work in the variation corresponds with an item description in the Bill of Quantities/Schedule of Rates, the rate in the Bill of Quantities/Schedule of Rates shall be used to calculate the value of the variation. If the nature of the Work in the variation does not correspond with items in the Bill of Quantities/Schedule of Rates, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.
- 13.3 If the Contractor's quotation is unreasonable, the Employer's Representative may order the variation and make a change to the Contract Price, which shall be based on the Employer's Representative's own forecast of the effects of the variation on the Contractor's costs.

14. Payment Certificates and Final Account

- 14.1 The Contractor shall be paid after each of the following stages of Work listed herebelow (subject to re-measurement by the Employer's Representative of the Work done in each stage before payment is made). In case of lump-sum Contracts, the valuation for each stage shall be based on the quantities so obtained in the re-measurement and the rates in the Schedule of Rates.
- (i) Advance payment **NIL** (*percent of Contract Price, [after Contract execution] to be inserted by the Employer*).
 - (ii) First stage (*define stage*) **AS PER PROGRESS**
 - (iii) Second stage (*define stage*) **AS PER PROGRESS**
 - (iv) Third stage (*define stage*) **AS PER PROGRESS**
 - (v) After defects liability period .
- 14.2 Upon deciding that Works included in a particular stage are complete, the Contractor shall submit to the Employer's Representative his application for payment. The Employer's Representative shall check, adjust if necessary and certify the amount to be paid to the Contractor within 14 days of receipt of the Contractor's application .The Employer shall pay the Contractor the amounts so certified within 14 days of the date of issue of each Interim Certificate.
- 14.3 The Contractor shall supply the Employer's Representative with a detailed final account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Employer's Representative shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Employer's Representative shall issue within 21 days a schedule that states the scope of the corrections or additions that are necessary. If the final account is still unsatisfactory after it has been resubmitted, the Employer's Representative shall decide on the amount payable to the Contractor and issue a Final Payment Certificate. The Employer shall pay the Contractor the amount so certified within 30 days of the issue of the Final Payment Certificate.

14.4 If the period laid down for payment to the Contractor upon each of the Employer's Representative's Certificate by the Employer has been exceeded, the Contractor shall be entitled to claim simple interest calculated pro-rata on the basis of the number of days delayed at the Central Bank of Kenya's average base lending rate prevailing on the first day the payment becomes overdue. The Contractor will be required to notify the Employer within 15 days of receipt of delayed payments of his intentions to claim interest.

15. Insurance

15.1 The Contractor shall be responsible for and shall take out appropriate cover against, among other risks, personal injury; loss of or damage to the Works, materials and plant; and loss of or damage to property.

16. Liquidated Damages

16.1 The Contractor shall pay liquidated damages to the Employer at the rate 0.01% of the Contract price per day for each day that the actual Completion Date is later than the Intended Completion Date except in the case of any of the occurrences listed under Clause 9.2. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

17. Completion and Taking Over

17.1 Upon deciding that the Work is complete the Contractor shall request the Employer's Representative to issue a Certificate of Completion of the Works, upon deciding that the Work is completed.

The Employer shall take over the Site and the Works within seven days of the Employer's Representative issuing a Certificate of Completion.

18. Termination

18.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. These fundamental breaches of Contract shall include, but shall not be limited to, the following;

- (a) the Contractor stops Work for 30 days continuously without reasonable cause or authority from the Employer's Representative;
- (b) the Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (c) a payment certified by the Employer's Representative is not paid by the Employer to the Contractor within 30 days after the expiry of the payment periods stated in Sub-Clauses 14.2 and 14.3 hereabove.
- (d) the Employer's Representative gives notice that failure to correct a particular defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time.

18.2 If the Contract is terminated, the Contractor shall stop Work immediately, and leave the Site as soon as reasonably possible. The Employer's Representative shall immediately thereafter arrange for a meeting for the purpose of taking record of the Works executed and materials, goods, equipment and temporary buildings on Site.

19. Payment Upon Termination

- 19.1 The Employer may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on Site, plant, equipment and temporary works.
- 19.2 The Contractor shall, during the execution or after the completion of the Works under this Clause, remove from the Site as and when required within such reasonable time as the Employer's Representative may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to him, and in default thereof, the Employer may (without being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor.
- 19.3 Until after completion of the Works under this Clause, the Employer shall not be bound by any other provision of this Contract to make any payment to the Contractor, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefore the Employer's Representative shall certify the amount of expenses properly incurred by the Employer and, if such amount added to the money paid to the Contractor before such determination exceeds the total amount which would have been payable on due completion in accordance with this Contract, the difference shall be a debt payable to the Employer by the Contractor; and if the said amount added to the said money be less than the said total amount, the difference shall be a debt payable by the Employer to the Contractor.

20. Corrupt Gifts and Payments of Commission

- 20.1 The Contractor shall not:
- (a) Offer or give or agree to give to any person in the service of the Employer any gifts or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract with the Employer or for showing or forbearing to show favour or disfavour to any person in relation to this or any other contract with the Employer.
 - (b) Any breach of this Condition by the Contractor or by anyone employed by him or acting on his behalf (whether with or without the knowledge of the Contractor) shall be an offence under the Laws of Kenya.

21. Settlement of Disputes

- 21.1 Any dispute arising out of the Contract which cannot be amicably settled between the parties shall be referred by either party to the arbitration and final decision of a person to be agreed between the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointed by the chairman of the Chartered Institute of Arbitrators, Kenya branch, on the request of the applying party.

APPENDIX TO CONDITIONS OF CONTRACT

THE EMPLOYER IS

Name: **Kenya Reinsurance Corporation Ltd**

Address: **P.O. Box 30271-00100, NAIROBI**

The name (and identification number) of the contract is Supply and Installation of a New 300 KVA Sound-Proofed Standby Generator set and Associated Ancillary Works at Reinsurance Plaza, Kisumu for Kenya Reinsurance Corporation Ltd.

The Works consist of **Supply and Installation of a New 300 KVA Sound-Proofed Standby Generator Set plus the associated ancillary works**

The Start Date shall be **as stated in the Letter of Acceptance**

The Intended Completion Date for the whole of the Works shall be **as stated in the letter of acceptance.**

The following documents also form part of the Contract: **(Only as listed in Clause 2)**

The Site Possession Date shall be **as stated in the letter of acceptance.**

The Site is located **at Kenya Re Towers, Upperhill, Nairobi**

The Defects Liability period is **12 Months**

Amount of Tender Security will be **as stated in the letter of invitation**

The name and Address of the Employer's representative for the purposes of submission of tenders is **Feradon Associates Ltd P.O.Box 7375-00300, Nairobi.**

The tender opening date and time is **as per invitation letter.**

The amount of performance security is **10 percent** bank guarantee of the Contract Price.

Period of final measurement : **12 months after practical completion**

Liquidated and Ascertained damages: **KSh. 50,000.00 per week, or part thereof**

Prime cost sums for which the Contractor desires to tender : **NIL**

Period of honouring certificate : **To be advised**

Percentage of certified value retained: **10%**

Limit of retention fund : **5%**

PART C:

**PRELIMINARIES
AND
GENERAL CONDITIONS**

PART C - PRELIMINARIES AND GENERAL CONDITIONS

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PART C

CONTRACT PRELIMINARIES AND GENERAL CONDITIONS

1.01 **Examination of Tender Documents**

The tenderer is required to check the number of pages of this document and should he find any missing or indistinct, he must inform the Engineer at once and have the same rectified.

All tenderers shall be deemed to have carefully examined the following:

- a) Work detailed in the Specification and in the Contract Drawings.
- b) The Republic of Kenya Document “General Conditions of Contract for Electrical and Mechanical Works”.
- c) Other documents to which reference is made.

He shall also be deemed to have included for any expenditure which may be incurred in conforming with the above items (a), (b), (c) and observe this expense as being attached to the contract placed for the whole or any part of the work.

The tenderer shall ensure that all ambiguities, doubts or obscure points of detail, are clarified with the Engineer before submission of his tender, as no claims for alleged deficiencies in the information given shall be considered after this date.

1.02 **Discrepancies**

The contractor shall include all work either shown on the Contract Drawings or detailed in the specification. No claim or extra cost shall be considered for works, which has been shown on the drawings or in the specification alone.

Should the drawing and the specification appear to conflict, the contractor shall query the points at the time of tendering and satisfy himself that he has included for the work intended, as no claim for extra payment on this account shall be considered after the contract is awarded.

1.03 **Conditions of Contract Agreement**

The contractor shall be required to enter into a contract with the Client.

The Conditions of the Contract between the Client and the contractor as hereinafter defined shall be the latest edition of the Agreement and Schedule of Conditions of Kenya Association of Building and Civil Engineering Contractors as particularly modified and amended hereinafter.

For the purpose of this contract the Agreement and Schedule of Conditions and any such modifications and amendments shall read and construed together. In any event of discrepancy the modifications and amendments shall prevail.

1.04 **Payment**

Payment will be made through certificates to the Contractor, All payments will be less retention as specified in the Contract. No payment will become due until materials are delivered to site.

1.05 **Definition of Terms**

Throughout these Contract documents units of measurements, terms and expressions are abbreviated and wherever used hereinafter and in all other documents they shall be interpreted as follows:

- i) **Employer:** The term “**Employer**” shall mean **Kenya Reinsurance Corporation Ltd**
- ii) **Consultants:** The term “**Consultant**” shall mean **Feradon Associates Ltd.**
- iii) **Contractor:** The term “**Contractor**” shall mean the firm or company appointed to carry out the Works and shall include his or their heir, executors, assigns, administrators, successors, and duly appointed representatives.
- iv) **Contract Drawings:** The term “**Contract Drawings**” shall mean those drawings required or referred to herein and forming part of the Bills of Quantities.
- v) **Working Drawings:** The term “**Working Drawings**” shall mean those drawings required to be prepared by the contractor as hereinafter described.
- vi) **Record Drawings:** The term “**Record Drawings**” shall mean those drawings required to be prepared by the contractor showing “as installed” and other records for the contract Works.
- vii) **Abbreviations:**

CM shall mean **Cubic Metre**

SM shall mean **Square Metre**

LM shall mean **Linear Metre**

LS shall mean **Lump Sum**

mm shall mean **Millimetres**

No. shall mean **Number**

Kg. shall mean **Kilogram**

BS shall mean. **Current standard British Standard Specification published by the British Standard Institution, 2 Park Street, London W1, England**

“**Ditto**” shall mean the whole of the preceding description in which it occurs. Where it occurs in description of succeeding item it shall mean the same as in the first description of the series in which it occurs except as qualified in the description concerned. Where it occurs in brackets it shall mean the whole of the preceding description which is contained within the appropriate brackets.

1.06 **Site Location**

The site of the contract Works is situated at **Kenya Reinsurance Plaza, Kisumu.**

The tenderer is recommended to visit the site and shall be deemed to have satisfied himself with regard to access, possible conditions, the risk of injury or damage to property on/or adjacent to the site, and the conditions under which the Contract Works shall have to be carried out and no claims for extras will be considered on account of lack of knowledge in this respect.

1.07 **Duration of Contract**

The contractor shall be required to phase his work in accordance with the programme (or its revision). The programme is to be agreed with the Client.

1.08 **Scope of contract Works**

The contractor shall supply, deliver, unload, hoist, fix, test, commission and hand-over in satisfactory working order the complete installations specified hereinafter and/or as shown on the Contract Drawings attached hereto, including the provision of labour, transport and plant for unloading material and storage, and handling into position and fixing, also the supply of ladders, scaffolding the other mechanical devices to plant, installation, painting, testing, setting to work, the removal from site from time to time of all superfluous material and rubbish caused by the works.

The contractor shall supply all accessories, whether of items or equipment supplied by the Client but to be fixed and commissioned under this contract

1.09 **Extent of the contractor's Duties**

At the commencement of the works, the contractor shall investigate and report to the Engineer if all materials and equipment to be used in the work and not specified as supplied by the others are available locally. If these materials and equipment are not available locally, the Contractor shall at this stage place orders for the materials in question and copy the orders to the Engineer. Failure to do so shall in no way relieve the Contractor from supplying the specified materials and equipment in time.

Materials supplied by others for installation and/or connection by the Contractor shall be carefully examined in the presence of the supplier before installation and connection. Any defects noted shall immediately be reported to the Engineer.

The contractor shall be responsible for verifying all dimensions relative to his work by actual measurements taken on site.

The contractor shall mark accurately on one set of drawings and indicate all alterations and/or modifications carried out to the designed system during the construction period. This information must be made available on site for inspection by the Engineer.

1.10 **Execution of the Works**

The works shall be carried out strictly in accordance with:

- a) All relevant Kenya Bureau of Standards Specifications.
- b) All relevant British Standard Specifications and Codes of Practice (Hereinafter referred to as B.S. and C.P. respectively).
- c) This Specification.
- d) The Contract Drawings.

- e) The Bye-laws of the Local Authority.
- f) The Architect's and/or Engineer's Instructions.

The Contract Drawings and Specifications to be read and construed together.

1.11 **Validity of Tender**

The tender shall remain valid for acceptance within 120 days from the final date of submission of the tender, and this has to be confirmed by signing the Tender Bond. The tenderer shall be exempted from this Bond if the tender was previously withdrawn in writing to the Employer before the official opening.

1.12 **Firm – Price contract**

Unless specifically stated in the documents or the invitation to tender, this is a firm-price Contract and the contractor must allow in his tender for the increase in the cost of labour and/or materials during the duration of the contract. No claims will be allowed for increased costs arising from the fluctuations in duties and/or day to day currency fluctuations. The Contractor will be deemed to have allowed in his tender for any increase in the cost of materials which may arise as a result of currency fluctuation during the contract period.

1.13 **Variation**

No alteration to the Contract Works shall be carried out until receipt by the Contractor of written instructions from the Employer's Representative

Any variation from the contract price in respect of any extra work, alteration or omission requested or sanctioned by the Engineer shall be agreed and confirmed in writing at the same time such variations are decided and shall not affect the validity of the Contract. Schedule of Unit Rates shall be used to assess the value of such variations. No allowance shall be made for loss of profit on omitted works.

Where the Client requires additional work to be performed, the Contractor, if he considers it necessary, will give notice within seven (7) days to the Client of the length of time he (the Contractor) requires over and above that allotted for completion of the contract.

If the Contractor fails to give such notice he will be deemed responsible for the claims arising from the delay occasioned by reason of such extension of time.

1.14 **Prime Cost and Provisional Sums**

A specialist Contractor may be nominated by the Consultant to supply and/or install any equipment covered by the Prime Cost or Provisional Sums contained within the contract documents.

The work covered by Prime Cost and Provisional Sums may or may not be carried out at the discretion of the Consultant.

The whole or any part of these sums utilized by the Contractor shall be deducted from the value of the contract price when calculating the final account.

1.15 **Bond**

The tenderer must submit with his tender the name of one Surety who must be an established Bank only who will be willing to be bound to the Contractor for an amount equal to 10% of the contract amount.

1.16 **Government Legislation and Regulations**

The contractor's attention is called to the provision of the Factory Act 1972 and subsequent amendments and revisions, and allowance must be made in his tender for compliance therewith, in so far as they are applicable.

The contractor must also make himself acquainted with current legislation and any Government regulations regarding the movement, housing, security and control of labour, labour camps, passes for transport, etc.

The contractor shall allow for providing holidays and transport for work people, and for complying with Legislation, Regulations and Union Agreements.

1.17 **Import Duty and Value Added Tax**

The contractor will be required to pay full Import Duty and Value Added Tax on all items of equipment, fittings and plant, whether imported or locally manufactured. The tenderer shall make full allowance in his tender for all such taxes.

1.18 **Insurance Company Fees**

Attention is drawn to the tenderers to allow for all necessary fees, where known, that may be payable in respect of any fees imposed by Insurance Companies or statutory authorities for testing or inspection.

No allowance shall be made to the Contractor with respect to fees should these have been omitted by the tenderer due to his negligence in this respect.

1.19 **Provision of Services**

In accordance with Clause 1.08 of this Specification the Contractor shall make the following facilities available to himself:

- a) Attendance and the carrying out of all work affecting the structure of the building which may be necessary, including all chasing, cutting away and making good brickwork,, including all plugging for fixing, fittings, machinery, fan ducting, etc., and all drilling and tapping of steel work shall be his responsibility. Any purpose made fixing brackets shall not constitute Builder's Work and shall be provided and installed by the contractor unless stated hereinafter otherwise.
- b) The provision of temporary water, lighting and power: All these services utilized shall be paid for by the Contractor.
- c) Fixing of anchorage and pipe supports in the shuttering, except that all anchorage shall be supplied by the Contractor who shall also supply the fully dimensioned drawings detailing the exact locations.
- d) Any specialist scaffolding, cranes, etc. by the Contractor for his own exclusive use shall be paid for by the Contractor.

1.20 **Suppliers**

The contractor shall submit names of any supplier for the materials to be incorporated, to the Engineer for approval. The information regarding the names of the suppliers may be submitted at different times, as may be convenient, but no sources of supply will be changed without prior approval.

Each supplier must be willing to admit the Engineer or his representative to his premises during working hours for the purpose of examining or obtaining samples of the materials in question.

1.21 **Samples and Materials Generally**

The contractor shall, when required, provide for approval at no extra cost, samples of all materials to be incorporated in the works. Such samples, when approved, shall be retained by the Engineer and shall form the standard for all such materials incorporated.

1.22 **Administrative Procedure and Contractual Responsibility**

Wherever within the Specification it is mentioned or implied that the Contractor shall deal direct with the Employer, it shall mean “through the Engineer” who is responsible to the Employer for the whole of the works including the Contract Works.

1.23 **Bills of Quantities**

The Bills of Quantities have been prepared in accordance with the standard method of measurement of Building Works for East Africa, first Edition, Metric, 1970. All the Quantities are based on the Contract Drawings and are provisional and they shall not be held to gauge or to limit the amount or description of the work to be executed by the Contractor but the value thereof shall be deducted from the Contract Sum and the value of the work ordered by the Engineer and executed thereunder shall be measured and valued by the Engineer in accordance with the conditions of the Contract.

All work liable to adjustment under this contract shall be left uncovered for a reasonable time to allow measurements needed for such adjustment to be taken by the Consultant. Immediately the work is ready for measuring the contractor shall give notice to the Consultant to carry out measurements before covering up. If the contractor shall make default in these respects he shall, if the Consultant so directs, uncover the work to enable the necessary measurements to be taken and afterwards reinstate at his own expense.

1.24 **Contractor’s Office in Kenya**

The Contractor shall maintain (after first establishing if necessary) in Kenya an office staffed with competent Engineer Manager and such supporting technical and clerical staff as necessary to control and coordinate the execution and completion of the Contract Works.

The Engineer Manager and his staff shall be empowered by the contractor to represent him at meetings and in discussions with the Client, Consultant and other parties who may be concerned and any liaison with the contractor’s Head Office on matters relating to the design, execution and completion of the Contract Works shall be effected through his office in Kenya.

It shall be the contractor’s responsibility to procure work permits, entry permits, licenses, registration, etc., in respect of all expatriate staff.

The contractor shall prepare a substantial proportion of his Working Drawings at his office in Kenya. No reasons for delays in the preparation or submission for approval or otherwise of such drawings or proposals will be accepted on the grounds that the Contractor’s Head Office is remote from his office in Nairobi or the site of the Contract Works or otherwise.

1.25 **Builder's Work**

All chasing, cutting away and making good will be done by the Contractor, including marking out in advance and shall be responsible for accuracy of the size and position of all holes and chases required.

The contractor shall drill and plug holes in floors, walls, ceiling and roof for securing services and equipment requiring screw or bolt fixings.

Any purpose made fixing brackets shall not constitute builder's work and shall be provided and installed by the Contractor unless stated hereinafter to the contrary.

1.26 **Structural Provision for the Works**

Preliminary major structural provision has been made for the contract Works based on outline information ascertained during the preparation of the Specification.

The preliminary major structural provision made will be deemed as adequate unless the contractor stated otherwise when submitting his tender.

Any major structural provision or alteration to major structural provisions required by the Contractor shall be shown on Working Drawings to be submitted to the Engineer within 30 days of being appointed.

No requests for alterations to preliminary major structural provisions will be approved except where they are considered unavoidable by the Engineer. In no case will they be approved if building work is so far advanced as to cause additional costs or delays in the work of the Main Contractor.

1.27 **Position of Services, Plant, Equipment, Fittings and Apparatus**

The Contract Drawings give a general indication of the intended layout. The position of the equipment and apparatus, and also the exact routes of the ducts, main and distribution pipework shall be confirmed before installation is commenced. The exact siting of appliances, pipework, etc., may vary from that indicated.

The routes of services and positions of apparatus shall be determined by the approved dimensions detailed in the Working Drawings or on site by the Engineer in consultation with the Contractor.

Services throughout the ducts shall be arranged to allow maximum access along the ducts and the services shall be readily accessible for maintenance. Any work, which has to be re-done due to negligence in this respect, shall be the Contractor's responsibility.

The Contractor shall be deemed to have allowed in his contract Sum for locating terminal points of services (e.g. lighting, switches, socket outlets, lighting points, control switches, thermostats and other initiating devices, taps, stop cocks) in positions plus or minus 1.2m horizontally and vertically from the locations shown on Contract Drawings. Within these limits no variations in the contract Sum will be made unless the work has already been executed in accordance with previously approved Working Drawings and with the approval of the Engineer.

1.28 **Checking of Work**

The contractor shall satisfy himself to the correctness of the connections he makes to all items of equipment supplied under the Contract agreement and equipment supplied under other contracts before it is put into operation. Details of operation, working pressures, temperatures, voltages, phases, power rating, etc., shall be confirmed to others and confirmation received before the system is first operated.

1.29 **Setting to Work and Regulating System**

The contractor shall carry out such tests of the contract Works as required by British Standard Specifications, or equal and approved codes as specified hereinafter and as customary.

No testing or commissioning shall be undertaken except in the presence of and to the satisfaction of the Engineer unless otherwise stated by him (Contractor's own preliminary and proving tests excepted).

It will be deemed that the Contractor has included in the Contract Sum for the costs of all fuel, power, water and the like, for testing and commissioning as required as part of the Contract Works. He shall submit for approval to the Engineer a suitable programme for testing and commissioning. The Engineer and Employer shall be given ample warning in writing, as to the date on which testing and commissioning will take place.

The contractor shall commission the contract Works and provide attendance during the commissioning of all services, plant and apparatus connected under the Contract Agreement or other Contract Agreements, related to the project.

Each system shall be properly balanced, graded and regulated to ensure that correct distribution is achieved and where existing installations are affected, the Contractor shall also regulate these systems to ensure that their performance is maintained.

The proving of any system of plant or equipment as to compliance with the Specification shall not be approved by the Engineer, except at his discretion, until tests have been carried out under operating conditions pertaining to the most onerous conditions specified except where the time taken to obtain such conditions is unreasonable or exceeds 12 months after practical completion of the Contract Works.

1.30 **Identification of Plant Components**

The contractor shall supply and fix identification labels to all plant, starters, switches and items of control equipment including valves, with white traffolyte or equal labels engraved in red lettering denoting its name, function and section controlled. The labels shall be mounted on equipment and in the most convenient positions. Care shall be taken to ensure the labels can be read without difficulty. This requirement shall apply also to major components of items of control equipment.

Details of the lettering of the labels and the method of mounting or supporting shall be forwarded to the Engineer for approval prior to manufacture.

1.31 **Contract Drawings**

The Contract Drawings when read in conjunction with the text of the Specification have been completed in such detail as was considered necessary to enable competitive tenders to be obtained for the execution and completion of the Contract works.

The Contract Drawings are not intended to be Working Drawings and shall not be used unless exceptionally they are released for this purpose.

1.32 **Working Drawings**

The contractor shall prepare such Working Drawings as may be necessary. The Working Drawings shall be complete in such detail not only that the Contract Works can be executed on site but also that the Engineer can approve the Contractor's proposals, detailed designs and intentions in the execution of the Contract Works.

If the contractor requires any further instructions, details, Contract Drawings or information drawings to enable him to prepare his Working Drawings or proposals, the Contractor shall accept at his own cost, the risk that any work, commenced or which he intends to commence at site may be rejected.

The Engineer, in giving his approval to the Working Drawings, will presume that any necessary action has been, or shall be taken by the Contractor to ensure that the installations shown on the Working Drawings have been cleared with the Main Contractor and any other Contractors whose installations and works might be affected.

If the Contractor submits his Working Drawings to the Client without first liaising and obtaining clearance for his installations from the Engineer and other Nominated/Specialist sub-contractors whose installations and works might be affected, then he shall be liable to pay for any alterations or modification to his own, or other Nominated/Specialist sub-contractor's installations and works, which are incurred, notwithstanding any technical or other approval received from the Engineer.

Working Drawings to be prepared by the Contractor shall include but not be restricted to the following:

- a) Any drawings required by the Main Contractor, or Engineer to enable structural provisions to be made including Builder's Working Drawings or Schedules and those for the detailing of holes, fixings, foundations, cables and paperwork ducting below or above ground or in or outside or below buildings.
- b) General Arrangement Drawings of all plant, control boards, fittings and apparatus or any part thereof and of installation layout arrangement of such plant and apparatus.
- c) Schematic Layout Drawings of services and of control equipment.
- d) Layout Drawings of all embedded and non-embedded paperwork, ducts and electrical conduits.
- e) Complete circuit drawings of the equipment, together with associated circuit description.
- f) Such other drawings as are called for in the text of the Specification or Schedules or as the Engineer may reasonably require.

Three copies of all Working Drawings shall be submitted to the Engineer for approval. One copy of the Working Drawings submitted to the Engineer for approval shall be returned to the Contractor indicating approval or amendment therein.

Approved Working Drawings shall not be departed from except as may be approved or directed by the Engineer.

Approval by the Engineer of Working Drawings shall neither relieve the Contractor of any of his obligations under the Contract nor relieve him from correcting any errors found subsequently in the Approved Working Drawings or other Working Drawings and in the Contract Works on site or elsewhere associated therewith.

The Contractor shall ensure that the Working Drawings are submitted to the Engineer for approval at a time not unreasonably close to the date when such approval is required. Late submission of his Working Drawings will not relieve the Contractor of his obligation to complete the Contract Works within the agreed Contract Period and in a manner that would receive the approval of the Engineer.

1.33 **Record Drawings (As Installed) and Instructions**

During the execution of the contract Works the Contractor shall, in a manner approved by the Engineer record on Working or other Drawings at site all information necessary for preparing Record Drawings of the installed Contract Works. Marked-up Working or other Drawings and other documents shall be made available to the Engineer as he may require for inspection and checking.

Record Drawings, may, subject to the approval of the Engineer, include approved Working Drawings adjusted as necessary and certified by the Contractor as a correct record of the installation of the Contract Works.

They shall include but not restricted to the following drawings or information:

- a) Working Drawings amended as necessary but titled "Record Drawings" and certified as a true record of the "As Installed" Contract Works. Subject to the approval of the Engineer such Working Drawings as may be inappropriate may be omitted.
- b) Fully dimensioned drawings of all plant and apparatus
- c) General arrangement drawings of equipment, other areas containing plant forming part of the Contract Works and the like, indicating the accurate size and location of the plant and apparatus suitability cross-referenced to the drawings mentioned in (b) above and hereinafter.
- d) Routes, types, sizes and arrangement of all pipework and ductwork including dates of installation of underground pipework.
- e) Relay adjustment charts and manuals.
- f) Routes, types, sizes and arrangement of all electric cables, conduits, ducts and wiring including the dates of installation of buried works.
- g) System schematic and trunking diagrams showing all salient information relating to control and instrumentation.
- h) Grading Charts.
- i) Valve schedules and locations suitability cross-referenced.
- j) Wiring and piping diagrams of plant and apparatus.
- k) Schematic diagrams of individual plant, apparatus and switch and control boards. These diagrams to include those peculiar to individual plant or apparatus and also those applicable to system operation as a whole.
- l) Operating Instruction

Schematic and wiring diagrams shall not be manufacturer's multipurpose general issue drawings. They shall be prepared specially for the Contract Works and shall contain no spurious or irrelevant information.

Marked-up drawings of the installation of the Contract Works shall be kept to date and completed by the date of practical or section completion. Two copies of the Record Drawings of Contract Works and two sets of the relay adjustment and grading charts and schematic diagrams on stiff backing shall be provided not later than one month later.

The contractor shall supply for fixing in sub-stations, switch-rooms, boiler houses, plant rooms, pump houses, the office of the Maintenance Engineer and other places, suitable valve and instructions charts, schematic diagrams of instrumentation and of the electrical reticulation as may be requested by the Engineer providing that the charts, diagrams, etc., relate to installations forming part of the Contract Works. All such charts and diagrams shall be of suitable plastic material on a stiff backing and must be approved by the Engineer before final printing.

Notwithstanding the Contractor's obligations referred to above, if the Contractor fails to produce to the Engineer's approval, either:-

- a) The Marked-up Drawings during the execution of the Contract Works or
- b) The Record Drawings, etc., within one month of the Section or Practical Completion

The Engineer shall have these drawings produced by others. The cost of obtaining the necessary information and preparing such drawings, etc., will be recovered from the Contractor.

1.34 **Maintenance Manual**

Upon Practical Completion of the Contract Works, the Contractor shall furnish the Engineer four copies of a Maintenance Manual relating to the installation forming part of all of the Contract Works.

The manual shall be loose-leaf type, International A4 size with stiff covers and cloth bound. It may be in several volumes and shall be sub-divided into sections, each section covering one Engineering service system. It shall have a ready means of reference and a detailed index.

There shall be a separate volume dealing with Air Conditioning and Mechanical Ventilation installation where such installations are included in the Contract Works.

The manual shall contain full operating and maintenance instructions for each item of equipment, plant and apparatus set out in a form dealing systematically with each system. It shall include as may be applicable to the Contract Works the following and any other items listed in the text of the Specifications:

- a) System Description.
- b) Plant
- c) Valve Operation
- d) Switch Operation
- e) Procedure of Fault Finding
- f) Emergency Procedures
- g) Lubrication Requirements
- h) Maintenance and Servicing Periods and Procedures
- i) Colour Coding Legend for all Services
- j) Schematic and Writing Diagrams of Plant and Apparatus
- k) Record Drawings, true to scale, folded to International A4 size
- l) Lists of Primary and Secondary Spares.

The manual is to be specially prepared for the Contract Works and manufacturer's standard descriptive literature and plant operating instruction cards will not be accepted for inclusion unless exceptionally approved by the Engineer. The Contractor shall, however, affix such cards, if suitable, adjacent to plant and apparatus. One spare set of all such cards shall be furnished to the Engineer.

1.35 **Hand-over**

The contract Works shall be considered complete and the Maintenance and Defects Liability Period shall commence only when the Contract Works and supporting services have been tested, commissioned and operated to the satisfaction of the Engineer and officially approved and accepted by the Employer, provided always that the handing over of the Contract Works shall be coincident with the handing over of the Main Contract Works.

The procedure to be followed will be as follows:

- a) On the completion of the Contract Works to the satisfaction of the Engineer and the Employer, the Contractor shall request the Engineer, at site to arrange for handing over.
- b) The Engineer shall arrange a Hand-over Meeting or a series thereof, at site.
- c) The Contractor shall arrange with the Engineer and Employer for a complete demonstration of each and every service to be carried out and for instruction to be given to the relevant operation staff and other representatives of the Employer.
- d) In the presence of the Employer and the Engineer, Hand-over will take place, subject to Agreement of the Hand-over Certificates and associated check lists.

1.36 **Painting**

It will be deemed that the Contractor allowed for all protective and finish painting in the Contract Sum for the Contract Works, including colour coding of service pipework to the approval of the Engineer. Any special requirements are described in the text of the Specifications.

1.37 **Spares**

The Contractor shall supply and deliver such spares suitably protected and boxed to the Engineer's approval as are called for in the Specifications or in the Price Schedules.

1.38 **Testing and Inspection – Manufactured Plant**

The Engineer reserves the right to inspect and test or witness of all manufactured plant equipment and materials.

The right of the Engineer relating to the inspection, examination and testing of plant during manufacture shall be applicable to Insurance companies and inspection authorities so nominated by the Engineer.

The Contractor shall give two week's notice to the Engineer of his intention to carry out any inspection or tests and the Engineer or his representative shall be entitled to witness such tests and inspections.

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

Plant or equipment which is shipped before the relevant test certificate has been approved by the Engineer shall be shipped at the Contractor's own risk and should the test certificate not be approved new tests may be ordered by the Engineer at the Contractor's expense.

The foregoing provisions relate to tests at manufacturer's works and as appropriate to those carried out at site.

1.39 **Testing and Inspection -Installation**

Allow for testing each section of the Contract Works installation as described hereinafter to the satisfaction of the Engineer.

1.40 **Labour Camps**

The Contractor shall provide the necessary temporary workshop and mess-room in position to be approved by the Architect.

The work people employed by the Contractor shall occupy or be about only that part of the site necessary for the performance of the work and the Contractor shall instruct his employees accordingly.

If practicable, W.C. accommodation shall be allocated for the sole use of the Contractor's workmen and the Contractor will be required to keep the same clean and disinfected, to make good any damage thereto and leave in good condition.

1.41 **Storage of Materials**

Space for storage will be provided by the Main Contractor but the Contractor will be responsible for the provision of any lock-up sheds or stores required.

The Contractor is to be made liable for the cost of any storage accommodation provided specially for his use. No materials shall be stored or stacked on suspended slabs without the prior approval of the Engineer.

1.42 **Initial Maintenance**

The Contractor shall make routine maintenance once a month during the liability for the Defects Period and shall carry out all necessary adjustments and repairs, cleaning and oiling of moving parts. A monthly report of the inspection and any works done upon the installation shall be supplied to the Engineer.

The Contractor shall also provide a 24 -hour break-down service to attend to faults on or malfunctioning of the installation between the routine visits of inspection.

The contractor shall allow in the Contract Sum of the initial maintenance, inspection and break-down service and shall provide for all tools, instruments, plant and scaffolding and the transportation thereof, as required for the correct and full execution of these obligations and the provision, use or installation of all materials as oils, greases, sandpaper, etc., or parts which are periodically renewed such as brake linings etc., or parts which are faulty for any reason whatsoever excepting always Acts of God such as storm, tempest, flood, earthquake and civil revolt, acts of war and vandalism.

1.43 **Maintenance and Servicing After Completion of the Initial Maintenance**

The Contractor shall, if required, enter into a maintenance and service agreement with the employer for the installation for a period of up to five years from the day following the last day of the liability for Defects Period which offers the same facilities as specified in Clause 1.41 (Initial Maintenance).

The terms of any such agreement shall not be less beneficial to the employer than the terms of Agreements for either similar installation.

The Contractor shall submit with his tender for the works, a firm quotation for the maintenance and service of the installation as specified herein, which shall be based upon the present day costs and may be varied only to take into account increases in material and labour unit rate costs between the time of tendering and the signing of the formal maintenance and service agreement and which shall remain valid and open for acceptance by the Employer to and including the last day of the fifth complete calendar month following the end of the liability for Defects Period.

1.44 **Trade Names**

Where trade names of manufacturer's catalogue numbers are mentioned in the Specification or the Bills of Quantities, the reference is intended as a guide to the type of article or quality of material required. Alternate brands of equal and approved quality will be acceptable.

1.45 **Water and Electricity for the Works**

These will be made available by the Contractor. The Contractor shall be liable for the cost of any water or electric current used and for any installation provided especially for their own use .

1.46 **Protection**

The Contractor shall adequately cover up and protect his own work to prevent injury and also to cover up and protect from damage all parts of the building or premises where work is performed by him under the Contract.

1.47 **Defects After Completion**

The defects liability period will be six months from the date of completion of the Main Contract as certified by the Engineer.

1.48 **Damages for Delay**

Liquidated and ascertained damages as stated in the Contract Agreement will be claimed against the Contract for any unauthorized delay in completion. The Contractor shall be held liable for the whole or a portion of these damages should he cause delay in completion.

1.49 **Clear Away on Completion**

The Contractor shall, upon completion of the works, at his own expense, remove and clear away all plant, equipment, rubbish and unused materials, and shall leave the whole of the works in a clean and tidy state, to the satisfaction of the Engineer. On completion, the whole of the works shall be delivered up clean, complete and perfect in every respect to the satisfaction of the Engineer.

1.50 **Final Account**

On completion of the works the Contractor shall agree with the Engineer the value of any variations outstanding and as soon as possible thereafter submit to the Engineer his final statement of account showing the total sum claimed sub-divided as follows:

Statement A - detailing the tender amounts less the Prime Cost and Provisional Sums, included therein.

Statement B - detailing all the variation orders issued on the contract.

Statement C - Summarizing statement A and B giving the net grand total due to the Contractor for the execution of the Contract.

1.51 **Fair Wages**

The Contractor shall in respect of all persons employed anywhere by him in the execution of the Contract, in every factory, workshop or place occupied or used by him for execution of the Contract, observe and fulfill the following conditions:

- a) The Contractor shall pay rates of the wages and observe hours and conditions of labour not less favourable than those established for the trade or industry in the district where work is carried out.
- b) In the absence of any rates of wages, hours or conditions of labour so established the Contractor shall pay rates and observe hours and conditions of labour are not less favourable than the general level of wages, hours and conditions observed by other employers whose general circumstances in the trade or industry in which the Contractor is engaged are similar.

1.52 **Supervision**

During the progress of the works, the Contractor shall provide and keep constantly available for consultation on site an experienced English - speaking Supervisor and shall provide reasonable office facilities, attendance, etc., for the Supervisor.

In addition, during the whole of the time the works are under construction, the Contractor shall maintain on site one experienced foreman or charge-hand and an adequate number of fitters, etc., for the work covered by the Specification. The number of this staff shall not be reduced without the prior written approval of the Architect or Engineer.

Any instructions given to the Supervisor on site shall be deemed to have been given to the Contractor.

Depending on the scope of coordination works required onsite, the Engineer shall recommend the appointment of a Resident Electrical Engineer, who will be required to be based on site. The Resident Engineer shall be appointed and paid by the Engineer. Provision to be made for the appointment of the Resident Engineer.

One copy of this Specification and one copy of each of the Contract Drawings (latest issue) must be retained on site at all times, and available for reference by the Engineer or Contractor.

1.53 **Test Certificates**

The Contractor shall provide the Engineer with three copies of all test reports or certificates that are or may be required by this Specification.

1.54 **Labour**

The Contractor shall provide skilled and unskilled labour as may be necessary for completion of the contract.

1.55 **Discount to the Main Contractor**

No discount to the Main Contractor will be included in the tender for this installation.

1.56 **Guarantee**

The whole of the work will be guaranteed for a period of twelve (12) months from the date of the Engineer's certification of completion and under such guarantee the Contractor shall remedy at his expense all defects in materials and apparatus due to faulty design, construction or workmanship which may develop in that period.

PART D:

GENERAL SPECIFICATIONS

FOR ELECTRICAL INSTALLATIONS

PART D: GENERAL SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

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PART D:

GENERAL ELECTRICAL SPECIFICATION

1 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.

1.1 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.

1.2 Regulations and Standards

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

- a) The Kenya Government Regulations.
- b) The United Kingdom Institution of Electrical Engineers (IEE) Regulations for the Electrical Equipment of Buildings.
- c) The United Kingdom Chartered Institute of Building Services Engineers (CIBSE) Guides.
- d) 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

1.03 Power Supply on Site

The supply voltage will be 240 volts single phase of 415 volts 3 phase 50 Hz. TN-S system, viz. separate neutral and protective conductor throughout the system.

2. INSTALLATION OF CABLES

2.01 General

Bending of cables shall be in accordance with table 52c of the IEE Regulations and no cable shall be bent to radius less than that specified by the cable manufacturers.

Cables shall be rated for the maximum connected load with due consideration to the following factors:-

- (i) Voltage drop not in excess of 4% of the nominal voltage.
- (ii) Ambient temperature.
- (iii) Degree of excess-current protection.
- (iv) Grouping.
- (v) Cables run under defined conditions.

2.02 Cables in conduits and Trunking

All cables shall be polyvinyl chloride (PVC) insulated to BS 6604, "PVC-insulated cables (non-armoured) for electric power lighting", 450/750 volt grade, unless an alternative is specified elsewhere in the contract documents. The quality and size of cables contained in any one conduit shall comply with IEE Regulation 529-7 and Appendix 12.

No cable with a cross-section area of less than 1.5mm² shall be used. All cables installed in a conduit or trunking system shall be PVC single insulated conductors and shall be colour coded in accordance with the IEE Regulation 524-3 and Table 52A.

Final sub-circuits shall be run in conduits separate from main or sub-main cables. All cables in conduit shall be drawn in simultaneously. All cables shall be drawn in without the use of excessive force, Without the use of lubricants and the wiring shall be easily withdrawable.

2.03 PVC/SWA/PVC Cable

These cables shall comprise copper conductors unless specifically detailed otherwise, laid up with PVC fillers bedded with an extruded inner PVC sheath, armoured with a single layer of galvanized steel wires, aluminium or strip as specified, and covered overall with PVC sheath.

Cables shall be manufactured to BS 6346 "PVC insulated cables for electrical supply" with conductor dimensions and resistances in accordance with BS 6360 1969, "copper conductors in insulated cables and cords", Armouring shall be galvanised steel to BS 1442.

Attention is drawn to Chapter 52 of the IEE Regulations and Appendix 9. Where the armour wires of cables are used to provide protective conductor they shall comply with the requirements of Chapter 54 of the IEE Regulations, particularly section 543; alternatively, additional cables with copper conductors shall be installed to reduce the impedance to a level which ensures compliance with Section 543 of the IEE Regulations.

Unless permission is given by the Engineer, no joints will be allowed. In the event of joints being authorized, they shall be made using plastic boxes of approved design filled with an approved cold pouring plastic or resin compound. The cable box shall incorporate suitable copper tapes and clamps to bond the armouring of the jointed cables.

The PVC/SWA/PVC cables should be terminated in the cable manufacture's approved glands. These shall be of the compression type providing controlled radial compression of the sheath seal. The gland shall incorporate an armour clamping ring and earthing ring and, where used outdoors, a lead washer shall be used to ensure a watertight joint between the gland and the unit to which it is fitted. The earthing ring shall be rigidly fixed to the item of equipment and terminated using brass

nuts, bolts and washers. All gland terminations shall be protected by a PVC shroud which shall fit tightly over the cables.

The electrical Sub-Sub-Contractor is responsible for determining the true nature and extent of cable routes. No claim on the grounds of lack of knowledge will be entertained. All cable routes shall be agreed with the Engineer. After the cables have been installed and terminated, but prior to putting into service, they shall be subjected to an insulation test of 500 volts and the results of these tests (recorded on test sheets) forwarded to the Engineer.

3. CONDUIT AND CONDUIT FACILITIES - MILD STEEL CONDUIT SYSTEM

3.01 Conduits

Conduits shall be installed as required by the IEE Regulations and as detailed in this specification. All metal conduits must be heavy gauge, seam welded, steel tube screwed conduits manufactured to BS 31, "steel tube screwed conduits and fittings for electrical wiring", Class B, BS 4568, "Steel conduit and fittings with thread of ISO form for electrical installation", for metric conduit, unless specified otherwise. Conduits shall be finished black stove enamelled, except in positions exposed to water (other than water used in construction), steam condensation or the action of weather, where hot galvanised conduits shall be used.

Any conduits work rejected by the Engineer shall be replaced at no extra cost. No conduit smaller than 20 mm in diameter or longer than 50mm diameter shall be used.

All bends in conduit shall be in accordance with the IEE Regulation 529-5, and made in a conduit bending machine fitted with a former of the correct radius for each conduit size.

Conduits shall be secured in an efficient pipe vice whilst being screwed. Conduit system shall be installed so as to ensure compliance with requirements of IEE Regulations 529-7. Attention is drawn to Appendix 12 of the IEE Regulations.

3.02 Conduit Fittings

Conduit fittings shall have same finish as the conduits being used and shall comply with BS 31 or BS 4586. All conduit fittings shall be screwed or loop-in malleable iron circular type, fitted with covers secured by brass screws. Rectangular adaptable steel boxes may be used on multi-conduit runs.

All circular type boxes must be fitted with long screwed spout conduit entries with the screwed thread terminating within the spout and the edges of the internal orifice of the box rounded and smoothed to act as a bush except for the adaptable steel rectangular boxes and loop-in conduit boxes, in which case male bush and coupling must be used for conduit connections. In concealed installation, boxes shall be fixed with the rims flush with the finished surface, but when, for any reason whatsoever, the rims are below the surface, suitable extension rings of the required depth shall be provided and installed to finish flush with the surrounding surfaces and with the lids of sufficient oversize (7.5 mm minimum all round) to cover the junction between box and plaster. In no case will the use of site-manufactured bends, sets, elbows, inspection elbows or tees be permitted.

3.03 Fixing of Conduits

All conduits must be firmly and rigidly fixed to be entirely without whip or movement. Space-bar saddles, or strap saddles, must be used on the timbers in roof spaces and will be allowed when the conduits are run on the underside of exposed unsealed floor or ceiling joints. Pipe hooks or crumpets will not be allowed except for security conduits in chases, or screeds, when the top of the hook must at least be 10 mm below the finished surface of the wall, or 25 mm below the floor finish. Pipe hooks shall be galvanised.

The finish of the saddles must in all cases conform to the finish of the supported conduits. Galvanised, sherardised or cadmium plated screws shall be used in all cases where galvanised conduits are installed.

The standard cast iron distance saddle, (single fixing base and two-screw fixing top), must be used for all conduits run on the surface of walls and ceilings etc., fixed at intervals of not more than 1.2 metres.

3.04 **Conduit Runs and Concealment**

The routes of the conduit installation shall be agreed with the Engineer prior to commencing the installation. Conduits shall be installed at least 150 mm from, and preferably under, any hot water pipes and at least 50 mm from other surface pipes and cables. Conduits shall be bonded to other surfaces in accordance with the requirements of IEE Regulations 413-2 and 547-4 to 547-7 inclusive.

Each continuity test shall be applied to the system before plastering, screeding, or casting of concrete is commenced. Surface work will be allowed where certain pre-fabricated methods of construction preclude the concealment of the runs, and or fair-faced brickwork or block work or other unplastered walls.

Conduit runs shall be planned to obviate the need for draw-in boxes, but where the use of such boxes is unavoidable they shall be accessible at all times and be fitted with covers. When Conduits are specified as being installed on the surface the runs must be arranged to render the whole system as neat and inconspicuous as possible, having regard to the existing architectural features. All vertical and horizontal runs must be taken where conduits converge and run together near distribution centres to obtain a symmetrical layout. The distance between the conduits shall be maintained through bends and sets and shall not vary noticeably.

3.05 **Flexible Metallic Conduit**

Flexible Conduit shall comply with the BS 731 part 1. "Flexible steel conduit and adaptors for the protection of electrical cables." It shall be used for the final connection from a rigid conduit installation to the terminal boxes of all the equipment provided with a means of positional adjustment and /or where vibration may reasonably be expected to occur.

Flexible conduits shall be PVC sheathed and shall be terminated using approved glands. In all instances a separate PVC insulated green and yellow coloured protective conductor complying with table 41A1 or 41A2 and section 543 of the IEE Regulations shall be installed, terminating at each end into purpose-made earthing terminals.

Under no circumstances will flexible conduits be accepted in lieu of sets and bends in a rigid conduit installation.

In normal circumstances flexible conduits shall have a minimum length of 300 mm and a maximum unstretched length of 800mm. It shall permit a full range of withdrawal, adjustment or movement of the equipment.

3.06 **Locking, Bushing and Coupling**

All conduit ends must be filed square and reamed before erection to ensure freedom from internal burrs and roughness.

Running couplings shall only be used on black enamelled steel conduit installations, and the use of this shall be kept to the minimum. All running couplings shall be secured by means of the lock nuts or lock rings, and the exposed thread painted after installation.

Every conduit connection to the equipment, boxes, distribution boards, loop-in boxes, cable trunking etc, shall be made by means of a screw coupling and a male hexagonal headed smooth bore brass bush. The smooth bore shall be fitted to secure the conduit to the item connected via a purpose-made clear hole to be closed by the bush and coupling when fitted. Paint must be removed from the surface of the item connected to allow it to be covered by the end of the coupling which shall be filed, clean and square, to ensure a good mechanical and electrical metal to metal joint. Any exposed area of metal from which paint has been removed must be made good in a matching paint. Bushes shall be fitted and tightened by means of correctly fitting spanners. Mutilated bushes damaged whilst being fitted must be removed and replaced.

Conduits connecting via couplings shall be connected by a means of 15 mm long threaded section and shall have a gap of approximately 2 mm between them. No thread shall be exposed except running couplings.

3.07 **Continuity and Earthing**

The whole of the conduit installations shall be mechanically and electrically sound and continuous throughout their length in accordance with the IEE Regulations.

Where the conduit system is used to provide a protective conductor it shall comply with the requirements of Chapter 54 of the IEE Regulations particularly Section 543; alternatively, a separate protective conductor shall be installed in the conduit to comply with Section 543 of the IEE regulations.

4. **CABLE TRUNKING-SHEET STEEL**

Trunking shall only be installed in situations which will remain readily accessible throughout the life of the buildings. No cable trunking shall be installed behind a plastered ceiling or in other inaccessible situations.

All cable trunking shall comply with BS 4678, part 1 "Steel surface trunking" and part 2 for "Steel underfloor (duct) trunking".

Sheet steel cable trunking may be used on installations employing steel conduits, for connecting two or more switchboards together or where several conduits would otherwise have to run alongside each other. Proper allowance should be made for the derating of cables installed together in a container system. The cables must be capable of carrying the current imposed by the equipment connected. Attention is drawn to Chapter 52 of the IEE Regulations, particularly Section 522, and Appendix 9: the current carrying capabilities of cables indicated shall not be exceeded. The Engineer must be consulted as to precise details concerning trunking routes and applications.

All lengths of trunking shall be heavy gauge zinc coated steel connected together by internally fitted rectangular couplings of sufficient width to provide a minimum bearing face of 25mm, to which the lengths shall be bolted on site or welded at the factory.

Adequate provision shall be made to allow for expansion.

All Tee pieces and bends shall be formed with similar means of connection and the inner radii area shall be such that cables will not be bent through a radius less than that prescribed in the IEE Regulations. Only bends and tees of approved pattern will be accepted.

All fixing screws within the trunking shall be of the round head type. The trunking shall have an over-lapping well-fitted lid securely fixed to the trunking by approved means that will avoid damage to the cables. Self-tapping screws shall not be used.

All necessary accessories including long sleeve couplings, end piece, bends, sets, tees, reducers, branches, fillets, pinracks, cable retainers etc., shall be purpose-made units rather than being fabricated on site.

Where a change in direction of trunking run occurs, the deviation should be effected by a purpose-made unit manufactured on similar lines to the bends and tee pieces described above. Where this is not practical, changes in direction shall be fabricated in a neat workmanlike manner. All joints shall fit closely and gaps will not be permitted. All burrs and sharp edges shall be removed and no screw shall protrude into the trunking.

Trunking shall be firmly attached to its associated equipment either by bolted flanges or by male bushes and couplings.

Where trunking is connected to equipment by means of flange connectors, the entry into the equipment shall be of the same cross-section as the trunking.

Where trunking does not terminate in equipment, the otherwise open end shall be capped with a cover suitable bolted in position.

Where communications, extra low voltage circuits (category 1) etc., are contained in a trunking, the requisite number of separate compartments shall be provided to segregate the wiring. Where conduits are taken off such trunking they shall not pass through other compartments unless prior permission is obtained from the Engineer.

The entire trunking is required to be recessed in the structure of the building, the finished edge of the trunking is to be installed flush with the plasterwork.

Trunking runs shall be so arranged that the lid or cover plate is always on the top or side and not underneath, unless this cannot be avoided, in which case the Engineer's permission shall be obtained.

Wherever trunking passes through walls, vertical partitions etc., a fixed piece of trunking lid shall be fitted to the trunking extended 25 mm either side of the wall or other barrier, this is to allow removal of the adjacent lid without disturbing the building fabric. Care shall be taken to ensure that no opening is left between the trunking and the building structure through which fire might spread. In addition a suitable barrier of incombustible material shall be provided and fitted inside the trunking, in accordance with the IEE Regulations 528-1. On vertical runs of trunking internal incombustible barriers shall be fitted at the distance between floors or 5m, whichever is the less, in accordance with IEE Regulations 523-6.

All necessary trunking support work, hangers, brackets and fixing requirements shall be provided by the electrical Sub-Sub-Contractor.

Earth links of the appropriate size and type shall be installed at every jointing coupling, manufactured bend, etc., throughout the entire trunking system. Where trunking is used to provide a protective conductor it shall comply with the requirements of Chapter 54 of the IEE Regulations, particularly Section 543; alternatively, a separate protective conductor shall be installed in the trunking to comply with section 543 of the IEE Regulations.

In cases where sheet steel trunking is installed and there is danger of movement, a flexible earth conductor shall be installed bonding all joints in the trunking. This shall be fitted in addition to the standard earth links. Cable retaining strips shall be fitted at 1 m intervals. Insulated cable support pins shall be fitted at intervals of 4 m in vertical runs of trunking and at the top of the vertical trunking.

5 CABLE TRAYS

Cable trays shall be formed from perforated steel of not less than 0.9 mm thickness up to and including 100 mm width - 1.25 mm thickness from 150 mm up to and including 300 mm width - and 2.00 mm thickness above 300 mm width. They shall be galvanised unless otherwise specified. Tray shall be adequately sized to support the cable without bunching.

Support shall be by means of steel brackets installed at intervals necessary to provide a rigid fixing and ensure that no undue deflection occurs in the complete installation. The brackets shall be galvanised prior to fixing. Dome-headed bolts, nuts and washers of finish suitable to the tray shall be used between tray and brackets.

Fixing to the surfaces of walls, ceilings, etc. shall be by means of expansion-type masonry plugs or bolts. Fixings shall be galvanised unless otherwise stated. Cable trays shall be installed using factory-formed bends, elbows, tees, couplers and risers etc. Site fabrication of elbows etc., will only be permitted with prior approval of the Engineer and where it is not possible to obtain the necessary factory-made item.

Where cuts have been made, the tray shall be painted with zinc rich paint.

Holes which have been cut to allow cables to pass through shall be suitably bushed.

Suspension sets shall comprise threaded M12 cadmium plated hanger rods together with nuts and locking washers, verticle hanger brackets, support channel, tray hold-down clips etc., all of which shall have a galvanised finish.

All cables shall be securely fixed to traywork and the complete installation must be carried out in a neat and workmanlike manner without crossovers. A 25% reserve margin in size and weight shall be allowed for all cable tray works.

Cables of 30 mm diameter and above shall be fixed using the appropriate size cable straps of approved manufacture.

On light duty multi-cable runs, cable straps of plastic coated metal shall be used to secure cables.

Bunching of cables will not be permitted.

Cables shall be clipped by means of copper or brass saddles and clips where high temperature or humid conditions are likely to be experienced. In all cases, saddles, clips, straps, etc., shall be fixed to the tray by means of brass screws or bolts and nuts.

6. PROTECTION OF PVC/SWA/PVC CABLES

6.01 General

Cable routing shall be such that the maximum degree of protection against accidental damage is obtained by running cables along the inside of channels and beams, etc.

Cables shall be laid in performed trenches or duct throughout all paved areas. Ducts shall be installed for underground cables before the paving is constructed.

Cable ducts shall be sealed at both ends using materials which are resistant to any likely corrosive and insect attack in the area concerned.

All cables rising through floors and trench covers, except in switch rooms, shall be protected by a length of steel pipe which shall project at least 150 mm above the finished surface level.

The open end of the pipe shall be sealed with a suitable compound. Care must be taken that all phases of single core cables pass through the same protective steel duct.

6.02 Cables Direct in Ground

All excavation and backfilling of cable trenches will be carried out by the main Sub-Contractor unless otherwise specified, but the electrical Sub-Sub-Contractor shall in any case make sure that trenches are made to a depth as specified.

The electrical Sub-Sub-Contractor shall lay cables direct in the ground in the following manner:-

75 mm (3 inches) of dry fine sand shall be placed to form a bed for the cables. After cables have been laid they shall be covered with additional dry fine sand well punned over and around the cables to a level of 75 mm above the top of the uppermost cable. Mechanical punners shall not be used for this work. The electrical Sub-Sub-Contractor shall supply and install concrete cable tiles which shall be carefully placed over the cable forming each circuit.

Until all the cables have been laid in the trench and have been covered with their protective tiles, no sharp metal tools such as spades or fencing stakes, shall be used in the trench. Rollers used during laying of cables shall have no sharp projecting parts liable to damage the cables.

6.03 **Cables above Ground**

For main cable runs the cable shall be run on approved tray or ladder rack, and secured to it at intervals of not more than 400 mm horizontally and 600 mm vertically.

Cables shall be dressed together and fixed with a common saddle. If the number of cables is such as to require the tiering of cables, the number of tiers shall generally be two.

7 **TERMINATION OF CABLES**

Cables shall be terminated in accordance with Chapter 52 of the IEE Regulations, particularly Section 527.

Cables shall be terminated by one of the following methods:-

- (i) The cable conductors shall be sweated into lugs of the appropriate size for the cable and equipment terminal.
- (ii) The cable conductors shall be secured by compression type lugs of the correct size for the cable and equipment terminal.
- (iii) The cable conductors shall be secured in pinch screw terminals.
- (iv) The cable shall be secured by means of clamps.

Where cables are required to terminate at connectors, as at lighting points, such connectors shall secure all the strands of stranded cables. Care shall be taken to ensure that cables are not damaged during preparation for termination.

Cables terminating at pinch screw terminals shall be twisted together and single cables shall have the conductor doubled back to ensure adequate purchase for pinching screws.

Cables connected to lamp holders or other components at which heat is produced shall be insulated with heat resisting material capable of withstanding, without detriment, the temperature encountered.

All terminations on PVC/SWA/PVC insulated cables shall be by compression type glands of an approved design and manufacture with facilities for clamping the armouring the outer sheath of the cable.

Glands mounted outdoors shall incorporate a seal to prevent ingress of moisture into the gland, and all glands shall be fitted with a thermoplastic shroud.

Where circular terminations are to be made, these shall be completed using Ross Counterney terminals.

Where cables are terminated in "Klippon" type terminals with parallel faced jaws, the individual cores shall be terminated using the appropriate flat or hook blade crimped lugs. Where the terminal faces are concaved, the cores shall be terminated in wires pin crimped lugs.

The electrical Sub-Sub-Contractor shall avoid multiple connections under one screw or one pin. Where more than two wires are required, a common termination jumper bar shall be used.

Terminals shall be mounted on rails or supports. All internal wiring is to be clearly marked by markers.

8 **SEGREGATION OF SERVICES**

Cables of differing voltages shall be segregated so that there is no possibility of a fault in a power cable damaging any adjacent cables or imposing a different voltage upon them.

9 **IDENTIFICATION OF CABLES**

All cables shall be fitted with non-corrosive cable identification bands at each end, and at all changes of direction where they leave a group of cables. All cables cores connected to equipment having marked terminals shall be fitted with non-corrosive identification bands bearing markings corresponding to those of the terminals at both ends.

10. **EARTHING**

The whole of the metallic portion of the installation, other than current carrying parts, shall be electrically and mechanically bonded to the consumer's main earth terminal and also if applicable, to the lighting protection system or other points specified.

The installation shall be earthed in accordance with the Sixteenth Edition of the Regulations for Electrical Installation issued by the IEE, BS CP1013, "Earthing" and BS 6651 "The protection of structures against Lightning". The electrical Sub-Sub-Contractor's attention is drawn to Chapter 54 of the IEE Regulations.

A main earth terminal shall be supplied and installed adjacent to the electricity supply cable termination. The terminal shall be of ample size and capacity to suit the installation. All items of equipment, switchgear, etc., shall be bonded to this earth terminal using PVC insulated PVC sheathed cables, coloured green and yellow and sized in accordance with Tables 41A1 of the IEE Regulations. An invarine label reading "**SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE**" in engraved upper case characters not less than 4.75mm high, shall be permanently fixed immediately adjacent to or on the earth terminal.

A heavy duty copper clamp complying with BS. 951 shall be used to bond the main protective conductor to the electricity supply cable armouring or metallic sheath (where applicable the armouring and sheath shall be bonded together).

All protective conductors shall, where possible, be enclosed within metal trunking or conduit serving switchgear, distribution board etc., so as to provide mechanical protection. Where protective conductors are run on building surfaces they shall be properly fixed and supported by means of PVC coated metal saddles along selected routes.

Earth continuity between separate items of switchgear, distribution boards etc., mounted adjacent to one another shall be affected by means of high conductivity continuous copper tape, or PVC sheathed cable, coloured green and yellow, and sized in accordance with the Table 41A1 or 41A2 and Section 543 of the IEE Regulations, connecting all items to the earth terminal.

All items of switchgear, accessories, luminaries, conduits, and the outer sheaths of MICS cables, the armouring of all PVC/SWA/PVC cables together with all other items of electrical plant and equipment shall be effectively earthed by means of a protective conductor in accordance with Table 41A1 and 41A2 and section 543 of the IEE Regulations.

At every terminal point on the fixed wiring an integral earth terminal shall be provide e.g. BESA boxes, accessory boxes etc. A protective conductor shall be provided and installed between this terminal and the earth terminal on the associated switch, socket outlet, luminaire etc.

Each circuit protective conductor shall be connected to a multi-way earth terminal provided and fixed within each distribution board. The earth terminal shall be provided with an adequate number of ways such that not more than one conductor per terminal shall be installed and the earthing conductors shall be connected in the same sequence as the current carrying conductors.

All metal piped services, e.g., Heating, Water and Gas Services, metal wastes and piped services at sinks, baths and showers etc., shall be bonded to the earth terminal in accordance with the IEE Regulations 413-2.

A 50mm section of each gas and water pipe, at position close to their entry into the relevant building, shall be cleaned and made smooth. A copper earthing clamp designed to permit the connection of protective conductors shall be provided and sized in accordance with Table 41A1 and 41A2 and Section 543 of the IEE Regulations.

The clamp shall be a proprietary type or shall be fabricated from high conductivity copper strip, minimum size 40 mm x 4 mm which shall encircle the cleaned sections of the pipe. A permanent label indelibly marked with the words, "**SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE**" in legible type not less than 4.75 mm high, shall be permanently fixed at the points of connections.

The final connection of bonding conductors from gas, water pipes and other services to the earthing terminal shall not be completed until earth electrode and earth impedance tests have been satisfactorily completed.

Bonding connections to pipework shall be as unobstructive as possible where practicable shall be made in service ducts or accessible voids and shall be readily on the Record Drawings. All materials and sundry item shall be provided whether or not specifically mentioned, necessary to completely and effectively earth the installation. The installation shall be fully protected against dampness and corrosion and the effect of electrolytic action between dissimilar materials. A completely permanent installation shall be provided which shall be fully accessible for regular testing and inspection.

The value of earth resistance from any point of an installation to the general mass of earth shall be low enough to ensure operation of circuit protective devices and shall in any case not exceed four(4) ohms for electrical equipment, seven (7) ohms for lighting protection. Each earthing cable shall terminate in an approved design of cable lug.

Where earth conductors are run upon structures or walls they shall be fastened by means of heavy gauge non-ferrous fasteners not more than 0.75 m apart on horizontal runs and not more than 1.2 m apart on vertical runs and to give a minimum clearance of 4 mm from the fixing face.

In the event of the electrical sub-Sub-Contractor not being able to establish a suitable earth connection to the electricity supply cable, earth electrodes shall be installed which shall be galvanised or copper clad steel extendable rods not less than 16 mm diameter and not less than 1.2 m in length. Connections to electrodes shall be made by means of solderless mechanical clamps.

To avoid corrosion, all earth system connections shall be cleaned bright and immediately covered with silicon MS4 compound or approved equal.

Earth pits, where required, shall be in accordance with the Sub-Contractor's relevant drawings, with the facility to disconnect the earth ring while measuring the electrode earth resistance.

11 **LIGHTNING PROTECTION**

Lighting protection shall be provided on high buildings/structures more than 10 m in height. such protection shall be effected by bonding each individual building/structures direct to the earthing system, in accordance with the BS CP 326, by a minimum size of 170mm² conductor.

12 **FUSED-SWITCH UNITS, SWITCHFUSES AND ISOLATORS**

The above units comply with BS 5419 and shall be 500 volt type and installed where specified and indicated on the relevant drawings.

All switchgear shall be provided with suitable locks for padlocking the switches in the 'OFF' position. The cover shall be interlocked with the operating mechanism to prevent it from being opened in the 'ON' position. This interlocking shall also prevent the switch from being closed with the cover open unless for maintenance purposes. The cover shall be gasketed to prevent ingress of dust.

The switch action mechanism shall be of the parallel operation (double break type having cartridge fuses mounted switches) and shall be ASTA certified to meet adequately all the duties specified.

The end plates shall be removable for drilling for conduit or cable entry and shall be fitted with additional distance pieces where necessary. Switchgear boards shall be fixed to the wall/floor by Rawl bolts or other approved fixings.

No building alteration shall be allowed when moving the switchboard into position, the switchboard being supplied in sections to be built in position, if so required.

Switchgear shall be delivered to site when required to suit the progress of the works. Care shall be taken to preserve the manufacturer's paint finish. Any refurbishing etc. shall be carried out, using paint obtained from the switchboard manufacturer, to the original standard of finish.

All fuses in switchgear shall be HRC fuses sized for the fused-switch units or switch-fuses etc., in which they are incorporated. They shall be ASTA certified for compliance with BS 88, Category of Duty 440 A.C 5 Class 01 and in all cases fuse links shall be selected to provide circuits discrimination.

13 CONTROL PANELS AND CUBICLES

The details specified in clause 4.11 shall apply as far as fused switches, bus-bars and rating etc are concerned. The panels shall be constructed from rolled steel channel minimum size 60 mm x 30 mm deep x 5 mm or equivalent angle section clad with sheet steel of 3 mm gauge. 2 mm gauge may be used for covers and doors of not more than 1 m square.

Terminals shall be of the "Klippon" standards rail-mounted feed-through type or approved equal. All terminals shall be identified by means of numbered or lettered marking tags, which shall be identical to the number of letter applied to the cables. Cables shall be identified as terminations by means of cable markers as manufactured by "Klippon" or approved equal. 25% spare terminals capacity within wiring duct shall be provided. All components motors, starters, relays, timers, etc. shall be labelled showing their reference and function and these shall relate to the panels' schematic wiring diagram provided with the "As-built" drawing and manuals.

All control panels shall be fitted with multi-pole isolating switches through which all electricity supplies shall pass. The door(s) of the control panel shall not open unless the isolating switch is in the "off" position. A facility to lock the control panel-isolating switch in the "off" position shall be included.

14 DISTRIBUTION BOARDS

14.1 General

All distribution boards, unless stated otherwise, shall be miniature Circuit Breaker Distribution Boards and shall be of surface or flush type, as specified. Facilities for local isolation of the distribution boards shall be provided by either a local fused-switch unit or an integral isolating switch, whichever is specified.

Where surface mounted on a flush installation, all conductors shall terminate behind the board in an adequate box. For surface mounting, trunking shall be fixed between the board and ceiling level, or conduits run directly into the board. Adequate earth continuity connection shall be made between the various components.

14.2 Fused Distribution Boards

All fuse boards shall be of 500 volt rating to BS. 5486 part 11 "Particular requirements for Fuse boards". The details specified in clause 4.12 shall apply as far as cabinet and construction, cabling arrangements, bus bars, neutral bars, earthing and isolating switches are connected.

Fuse banks shall be spaced so as to obviate the necessity for insulating barriers, but protection shall be provided by means of insulating shields to prevent accidental contact with the main bus bars and connections.

All fuses lighting and heating circuits shall be of the HRC cartridge type, ASTA certified, for compliance with BS. 88, category of Duty 440 A.C 5 class 01.

14.3 Miniature Circuit-Breaker Distribution Boards

MCB distribution boards shall comply with BS. 5486 part 12 'Particular requirements for miniature circuits-breaker boards'. The cases shall be constructed of heavy gauge sheet steel, in such a manner as to afford rigidity and maximum ease of wiring for full size circuit and main cables.

The cover shall be provided with an efficient gasket or alternatively designed with generous overlapping edges to prevent the ingress of dust. Components shall not be manufactured from zinc alloy in conjunction with sheet steel where they are relied upon for earth continuity.

Where the cover is required to be lockable, cylinder type locks shall be provided, having two keys per lock. All locked distribution boards shall be handed to the Engineering Supervisor on completion of the works. The cases shall be provided with detachable cable/conduit terminating plates, which shall be reversible and interchangeable from top to bottom.

All screws and nuts used in the construction of the case shall be fitted with shake proof washers and care taken to ensure efficient earth continuity. An external earthing terminal with cable socket shall be fitted.

All MCB banks shall be fitted to frames, with robust locking plates provided to ensure the frames rigidly in the fixed position.

The banks shall be so spaced to obviate the necessity for insulating barriers, but protection shall be provided by means of insulating shields to prevent accidental contact with main bus bars and incoming mains cable.

Bus-bars shall be of high conductivity, hard drawn copper conductors connected to the MCB contacts by means of spring washered screws or bolts, unless plug-in type MCBs are specified.

Neutral bars shall be similar to the main bus bars and shall have two screw terminals per way for rating of 30 amps or over. Single screw connections will be allowed for capacities up to 30 amps. The neutral bars shall have one terminal for each MCB within the board, and connection of conductors to the neutral bar shall be in the same order as the MCB ways.

Where installations are carried out with cables with a protective conductor, all distribution boards shall also contain internal earthing bars similar to the neutral bars detailed above, with one terminal for each MCB within the board. Earthing conductors shall be connected in the manner described for neutral conductors to neutral bars.

Where a main integral isolating switch is provided in an MCB case it shall be arranged to isolate incoming live and neutral main cables from the bus-bars. The isolator switch shall be rated at 500 volts and of the quick make-and break pattern with positive action. Incoming and outgoing terminals shall be fitted with two clamping screws and outgoing conductors to the bus-bars shall be high conductivity hard drawn copper rods.

Isolating switches shall comply with IEE Regulations, Part 537, and shall be capable of carrying their full rated load continuously and shall 'make' or 'break' their full rated load without undue burning of the contacts.

14.4 **Miniature Circuits Breaker (MCB)**

All MCBs shall have movements which are positive in both directions (make and break) so as to enable units to be closed decisively by the operation of the handle, and to be able to assume the 'OFF' position unless the contacts are definitely separated, to safeguard against false indications.

The handle shall be trip free to make it impossible for the operator to hold the breaker in the closed position under faulty conditions. The operating mechanism and arc chambers of the circuit breaker shall be separated from the terminals and fixing screws.

Terminal identification shall be readily discernable as viewed from the front of the board with automatic and clear signal identification for both 'ON' and 'OFF' position.

All terminals shall be readily accessible from the front and each wiring chamber shall be closed by a screw fixed cover which protects the terminals and prevents dust from settling on the insulation.

Where the full capacity of a distribution board is not required the electrical Sub-Sub-Contractor shall fix blanking plates in the vacant MCB housings. All MCBs shall be rated at 500 volts minimum, and comply with BS 3871. "Miniature and moulded case circuits breakers" and 4752 part 1, "Circuit breakers".

14.5 **Moulded Case Circuit Breakers (MCCB)**

Where specified, MCCBs shall be of the thermal/magnetic type, having a quick make, quick break, trip free mechanism which prevents the MCCB from being closed or held against short circuits or overloads. Tripping of every multi-pole MCCB shall be such that operation ensures simultaneous action in all phases.

Clear indication shall be provide for the three positions of operation of the mechanism - 'ON', 'OFF' and 'TRIPPED'. The operation shall be such that the MCCB shall trip automatically under fault conditions and, to reset, the dolly shall require first moving through the 'off' position. All MCCBs shall be provided with facilities for locking the breaker in 'OFF' position.

All MCCBs shall be rated at 500 volts minimum, be ASTA certified for this operational duty, and comply with BS. 3871 and BS. 4752 Part 1.

15 **LABELLING AND ENGRAVING**

15.1 **Labelling**

All fused-switch units, switch-fuses, switches, bus-bars chambers, distribution boards etc., and all items of equipment on the main panel shall be identified in accordance with section 514 of the IEE Regulations and shall have securely fitted externally a white 'Traffolyte', 'Formica' or other approved plastic laminate label engraved with 6 mm high black letters detailing the function of the equipment and any reference number.

Red, yellow, blue, plastic laminate phase discs shall be fixed inside all switchgear and distribution boards to indicate to which phase of the supply the various circuits are connected. The colourings shall comply with Part 524 of the IEE Regulations.

Each TP or TP & N item of switchgear shall have fitted on the cover a white plastic laminate label having 'CAUTION' - 415 VOLTS' engraved in 10 mm high red lettering.

5.2 **Engraving**

The electrical Sub-Sub-Contractor shall allow for engraving of all switched fused spurs, double pole switch accessories and any other accessories, which are customarily required. The accessory plate shall be engraved in either black or red, capital letters 5 mm high, detailing and appliance or equipment being supplied by the accessory e.g., 'WATER PUMP' etc.

16 **MOUNTING HEIGHTS**

The approximate position of main switchgear, control equipment distribution boards, fittings and accessories shall be as indicated on the Drawings. Actual positions shall be determined on site by the Engineer.

Unless otherwise stated on the relevant drawings or directed by the Engineer the following mounting heights of all accessories above finished floor level shall be adhered to: -

Lighting Switches	1400 mm to centre
Socket Outlet and Spur	300 mm to centre (or 150 mm above work top level to centre)
Distribution Boards	1800 mm to lower edges.

All groups of accessories shall be in line either vertically or horizontally or as specified.

17 **LUMINAIRES**

All Luminaires shall be of the manufacture, size and type specified and shall comply in all respects to BS 4533 "Electric Luminaires".

The electrical Sub-Sub-Contractor shall supply and install all luminaires including lamps, lamp-holders, control gear, capacitors, glassware, diffusers or other attachments, heat resistant internal cables, fuses and terminals and all necessary suspension gear. In case where Luminaires are supplied by the client the Sub-Sub-Contractor shall deliver to site store, install, commission and set to work.

Unless otherwise stated, Luminaires shall be suitable for Class 1 normal indoor environments, giving a degree of protection against ingress of moisture or dust.

All Luminaires shall be assembled and installed in accordance with the respective manufacturer's instructions/recommendations, in the position and mounting heights specified.

Luminaires shall not be installed under dirty and hazardous site conditions, and any damage or deterioration to luminaires installed under these conditions shall be made good by the electrical Sub-Sub-Contractor.

The Luminaires shall be cleaned free of dust and dirt after completion of the installation. Where dirt, dust, corrosion or other conditions cause imperfections in the luminaires, they shall be replaced.

Luminaires, diffusers, attachments or glassware etc., shall be properly stored to final erection, in such a manner as to avoid damage of any kind.

Luminaires fixings shall generally be suitable for direct connection to conduit boxes or as otherwise specified. Luminaires not provided with suitable BESA box shall be modified as necessary.

Where a flexible cord supports, or partly supports, a luminaire the maximum mass supported by the cord shall not exceed the values set out in IEE Regulations 523-32.

The minimum cross-section area flexible core to the employed shall be 0.75mm^2 .

Specified attention shall be given to Chapter 52 of the IEE Regulations, particularly Regulation 521-5 and 521-6, Appendices 9 and 10.

Pendant tungsten luminaires shall be fitted with heat resistant flexible cord complying with BS 6500, capable of continuous operation with a conductor temperature of 150 degrees C. The cable shall be of the circular multicore type, finished white, if not otherwise specified.

Ceiling mounted tungsten luminaires, spotlights and other luminaires of the category 'hot' luminaires shall be wired internally with cable suitable for continuous operation at 185 degree C. Where cable tails are provided they shall be of the heat resistant type capable of operation at 185 degree C.

Exterior luminaires, fixed to the walls of buildings etc., shall be wired such that final circuit wiring terminates within the luminaire. All final circuit cables so installed shall be provided with heat resistant sleeves from the connection point within the luminaire for a distance of 300 mm.

All fluorescent and other discharge luminaires shall be provided with an integral fused connector block. The rating of the fuse shall be in accordance with the manufacturer's instructions to protect the internal wiring of the luminaire and to provide discrimination between final circuit protection and luminaire protection.

All recessed and semi-recessed luminaires in ceilings shall be connected by three core 0.75mm^2 high temperature flexible cord from the terminals of the luminaires to a plug-in ceiling rose fixed and connected to an accessible outlet box in the wiring system, within the suspended ceiling immediately above the luminaire. The ceiling rose shall be accessible via the opening provided in the ceiling.

The electrical Sub-Sub-Contractor shall ensure that the methods of suspension for luminaires are electrically and mechanically sound.

Luminaires suspended by means of tubes shall be fitted to ball joints allowing a swing of at least 20 degrees all round. Reliable earthing between the fixed and moving parts shall be provided by means of a flexible braided copper tape.

Fluorescent luminaires shall be provided with a minimum of two fixings, except in the case of recessed modular luminaires or surface-mounted luminaires exceeding 300 mm in width, where four number fixings (one from each corner) shall be provided by means of conduit drops or threaded rods.

Normally visible luminaires support shall be conduit. All fluorescent luminaires shall be solidly mounted with all assembly nuts, bolts and accessories made tight to prevent vibrations and noise. Anti-vibration packing shall be fitted where necessary. luminaires mounted direct to trunking shall be fixed by means of the manufacturer's recommended fixing assemblies.

Unless stated otherwise, all luminaire supports shall be fixed to the building primary structure. Luminaires shall not be supported from suspended ceiling unless otherwise specified. The electrical Sub-Sub-Contractor shall be responsible for mounting and fixing arrangements.

Break joint rings of approved colour shall be provided for all suspended luminaires and fluorescent battery luminaires where the batten is of insufficient width to cover completely the conduit box and its associated clearance hole in the ceiling.

The metalwork of all luminaires shall be effectively bonded to the earthing system in accordance with Chapter 54 of the IEE Regulations.

Care shall be taken to ensure that the internal wiring of luminaires and the cable of any fixed wiring shall not be in contact with high temperature areas in luminaires.

Lighting track shall be of the type, size, finish, number of circuits and manufacture specified and shall comply with the requirements of the relevant section of BS. 4533. The positions of luminaires as shown on the Drawings are approximate only and exact position shall be determined after reference to the Engineering supervisor.

18. **CEILING ROSES**

Surface mounted ceiling roses shall be of all insulated, high impact moulded plastic construction complying with BS. 67 and shall be suitable for direct attachment to conduit outlet boxes. Recessed or semi-recessed ceiling roses shall be manufactured from porcelain. Break joint rings shall be provided when used on flush conduit outlet boxes.

Ceiling roses shall not be connected to fixed wiring in such a manner that one of the terminals remains 'live' when the associated switch is in the 'off' position, unless that terminal is inaccessible to touch when the ceiling rose cover is removed, e.g. for replacement flexible cord.

Terminals shall be provided for switched live, neutral and protective conductors. Loop-in facilities shall also be provided.

19. **LAMPS**

Lamps shall be compatible with the luminaire for which they are intended and shall be of the wattage, type and colour specified. Lamps shall be of the correct voltage rating for the particular electricity supply concerned.

Tungsten filament lamps, unless otherwise specified, shall be of the 'PEARL' type and of the long-life type giving 2000 hours average life.

Luminaires designed to accommodate lamps with reduced physical dimensions shall be fitted with lamps of the mushroom type of approved equal.

20 **EXTERNAL LIGHTING**

External lighting system shall comprise the lighting points at the position shown on the Drawings and shall include the provision, erection and connection of all lighting columns, bollards, wall and ceiling luminaires and the provision and connection of all control gear together with the laying, jointing and connection of all necessary cables.

All excavation, trenching, backfilling etc., will be undertaken by the main Sub-Contractor.

All lighting columns shall be of the type specified, suitable for looping in and out three No.2 Core PVC/SWA/PVC cables of the specified size.

Where discharge lamps are specified the associated controlgear shall be mounted in the base of the column above the fused 'cut out', all on a timber board housed within the base of the column.

Each lighting column/bollard shall be completed with all adaptors, spigots, mounting brackets, luminaires, controlgear and lamps and shall be provided with a base compartment and locking door.

All column/bollards shall be fixed in the position specified.

Cable routes are shown on the relevant drawings and the electric Sub-Sub-Contractor shall lay the lighting cables in the trenches.

All connections shall be made in an approved manner, and the installations shall be finished complete and handed over in working order to the full satisfaction of the Engineer.

21 **LIGHTING SWITCHES**

Lighting switches shall be of the type, size and manufacture as specified.

Wall and ceiling switches shall comply with BS 3676. Wall and ceiling switches controlling A.C lighting circuits shall be rated 20 amp and be of the slow break quick make, type unless stated otherwise.

Where several switches on one phase are shown at one position, a ganged box shall be used.

Where switches at any location are connected to different phases, purpose-make phase barrier switches shall be installed. The phases shall be separated by means of rigidly fixed barriers and the cable for each phase shall be confined to the area enclosed by the barriers for that phase.

Switches connected to a particular phase shall have separate cover or covers fitted over each phase. The covers shall be engraved "CAUTION 415 VOLTS".

The switch plate of the specified finish shall be fitted over phase covers to render the switch unit indistinguishable from the switches that are not phase barrier switches.

Alternatively, each gang shall have its own piping and box for each phase, physically separated from other phases with similar arrangements.

For flush position on a plastered or equivalent finish wall, the switches shall have overlapping plates.

In any places where the finish is fair-faced brickwork, the wiring shall be installed on the back of the wall and make a back entry into the accessories. Each switch in these areas shall be neatly recessed and incorporate an overlapping plate.

For surface-mounted positions and such Plant Rooms, Electrical Switch room etc., employing a surface-mounted system or wiring, switches shall be surface-mounted, having metal front plates of an aluminium finish, mounted in matching metal boxes.

22 **SOCKETS OUTLETS**

All socket outlets and plugs shall be supplied and installed in accordance with the manufacture, type, sizes and finish specified.

All round pin 2A, 5A, 15A, and 30A socket outlets shall comply with the requirements of BS 546.

All sockets outlets shall be switched, unless otherwise specified.

All switched sockets outlets shall be complete with steel boxes of the same manufacture, complete with earth terminal.

Assemblies shall comply fully with the requirements of the IEE Regulations concerning the bonding of protective conductor terminals and each such terminal shall be connected by a conductor, having a minimum cross-sectional area of 2.5 mm², to a permanent earthing terminal incorporated in the associated box providing an effective, solid connection to the earth continuity conductor of the installation.

Where the assembly does not provide a reliable electrical contact between the cover plate and box with effective connection of metal operating bars and toggles, then an insulated earthing lead shall be provided, solidly connected to the metal plate and operating bar or toggle and terminating at the fixed earthing terminal incorporated in the associated box. 13 amp sockets will generally be installed using ring circuits in accordance with Appendix 5, Table 5A of the IEE Regulations.

All plugs shall be of moulded rubber or other resilient material complying with BS 1363 or BS 546. The plug shall have internal cord grip. 13 amp plugs shall be fitted with cartridge fuse links to BS 1362. The fuse rating shall be selected to give protection to the flexible cord or cable connected.

All fuses installed within 13 amp plug top, fused spurs, clock connections etc., shall be cartridge fuse links rated at 240 volts, ASTA certified for compliance with BS 1362 'General purpose fuse links for domestic and similar purposes', or BS 464 'Cartridge fuse links (rated at up to 5 amperes) for AC and DC service', or BS 2950 'Cartridge fuse-link for telecommunications and light electrical apparatus'.

All equipment, which is locally fused, shall have fitted fuses with characteristics, which are recommended by the manufacturer of the equipment.

If any appliance or equipment suffers due to incorrect fusing of the appliances, such appliances or equipment shall be repaired or replaced at the electrical Sub-Sub-Contractor's cost, to the satisfaction of the Engineer.

23 **INSPECTION AND TESTING**

A visual inspection shall be made in accordance with IEE Regulations 612-1. References shall be made to appendix 14 of the IEE Regulations, which is a checklist for initial inspection of installations.

The electrical installation shall be inspected and tested by the electrical Sub-Sub-Contractor in accordance with part 6 of the IEE Regulations.

Where any part of installation is to be concealed within a building, fabric tests shall be made to ensure that the installation is satisfactory prior to concealment.

Upon completion of the works the whole installation shall be subjected to the tests detailed hereafter and every defect shall be noted, corrected and brought to the notice of the Engineer.

All tests shall be witnessed by the Engineer to his full satisfaction and he shall be given at least one week's notice in writing of the proposed tests.

All labour and test instruments shall be provided by the electrical Sub-Sub-Contractor and the instruments shall be correctly calibrated and certified for the limits of accuracy required and shall be operated by competent person. If, in the Engineer's opinion, a particular instrument is not suitable, then an acceptable alternative shall be provided. The Engineer shall be at liberty to demand the use of any testing instrument or apparatus that he may reasonably consider to be necessary in the execution of the testing.

In the event of the installation failing to pass the test, the Engineer has the full authority of the Employer to deduct from the Contract Price all reasonable expenses incurred, due to him being required to attend a repetition of the test.

The following items, where relevant, shall be tested in the sequence indicated. Standard methods of testing, in respect of some of the following regulations of this section, are given in Appendix 15 of the IEE Regulations.

- i) Continuity of ring final circuit conductors.
- ii) Continuity of protective conductors, including main supplementary equipotential bonding.
- iii) Earth electrode resistance.
- iv) Insulation resistance.
- v) Insulation of site-built assemblies.
- vi) Protection of barriers or enclosures provided during erection.
- vii) Insulation of non-conducting floors and walls.
- viii) Polarity.
- ix) Earth fault loop impedance.
- x) Operation of residual current devices and fault voltage operated protected devices.

Upon completion of all tests and commissioning, two copies of detailed certificates shall be provided by the electrical Sub-Contractor to show that the equipment, materials, installation etc., have been tested and commissioned. One copy of each, duly completed and signed shall be submitted to the Engineer within 154 days of the results being obtained. The second copy of the certificates shall be retained to be included with operator and maintenance manuals.

The results of the test and details of completion for the electrical test shall be detailed on the Test and Completion Certificates respectively; issued by the National Inspection council for Electrical Installation Contracting or other approved authority.

24 **AS BUILT DRAWINGS, AND DOCUMENTATION**

Within one month of the date of completion the electrical Sub-Contractor shall provide 3 prints of all electrical drawings showing the electrical installations "As built". In case the electrical Sub-Contractor fails to provide "As Built" drawings as required, these will be prepared by others at the expense of the electrical Sub-Contractor.

APPENDIX 1

SUPPLEMENTARY SPECIFICATION FOR PVC INSULATED CABLES

AND NON-METALLIC CONDUITS WIRING SYSTEM.

1. PVC 1 CABLE

The wiring shall be carried out in 250-volt grade or 440 volt grade for 3-phase PVC Insulated cable, as specified elsewhere run in non-metallic conduit. The cable shall be of the sizes specified on the drawing.

2. INSTALLATION OF WIRING

Cable shall be drawn into accessories, distribution boards and switchgear after the erection of the conduit system. Under no circumstances shall it be permitted to draw cable into an incomplete section of the conduit installation.

3. JOINTS IN CABLES

The wiring shall be carried out on the looping-in principle. All joints shall be made at the terminals of main switches, distribution boards, ceiling roses, switches and socket outlets, etc. and fixed apparatus only. No joints shall be made in boxes unless approved.

4. CAPACITY OF CONDUITS

The cable shall run in the conduit so as not to exceed the capacities as set out in Table 10 of the IEE Regulations (13th Edition with current amendments).

Conduits shall be best quality new super high impact grade heavy gauge 'A' riding PVC unplasticised conduits as manufactured by Egetude limited suitable for plain connections.

Conduit of sizes less than 20 mm shall not be used without the written authority of the D.R.

5. BENDING

The conduit shall be bent and formed strictly in accordance with the manufacturer's instructions: -

- i) Small size, i.e. 20 and 25 mm shall be bent cold by inserting the correct size bending spring. It is essential for right angle bends that the conduit is bent past 90 degrees to allow for "spring back".
- ii) Large size of conduit shall be pre-heated before inserting rubber cord to prevent kinking. Conduit badly formed or bent or damaged in any way, shall not be used.

6. JOINTING

Joints shall be made water-tight by the use of 'Egaweld' cement applied with a brush or rug. 'Egaweld' shall be applied to the complete circumference of conduit. Conduit shall be thoroughly cleaned at the ends to ensure a good adhesion of the fittings. 'Egaweld' shall not be permitted to enter into the conduit.

7. CONDUIT FITTINGS

All conduit fittings and accessories, including couplers, ordinary clips, saddles, pipe hooks, reducers, stopping plugs, lockouts and male and female bushes shall be manufactured dimensionally, similar to B.S.S. 31/1940. Solid tees shall not be used. Solid inspection elbows or bends or inspection tees shall be used only in exceptional circumstances and then only with D.R.'s approval.

Where it eases the installation of cast-in-situ back entry boxes on the loop-in system, purpose made bends manufactured by Egatube and comprising a tight bend with a push socket at one end and a threaded socket at the other end may be used with the D.R.'s approval.

8. **FIXING OF CONDUITS**

Conduit shall be installed on the loop-in system and shall either be cast-in-situ in the main concrete structure, concealed in chases cast in concrete walls, or chases cut in solid partition walls, run in ceiling spaces or in hollow partitions of floors, or concealed below the floor screed, whichever shall prove to be the most suitable method of installation for use in the building under construction. Unless it is clearly specified or shown on the drawing, the method of installing conduit shall be subjected to the approval of the D.R.

Sunken conduit run in chases in walls shall be fixed by means of mild steel pipe hooks or non-metallic saddles spaced not more than 1 m apart. Where conduit is concealed behind plaster it shall be sunk to a depth of either 10 mm below finished plaster level, or installed flush with the structural wall level before application of plaster, whichever is the lesser depth.

Conduit fixed on the surface of walls or ceiling shall be fixed by spacer bar saddles fixed not more than 1 m apart.

Surface conduit shall also be fixed 230 mm on both sides of all boxes, the box itself securely fixed. Where such an arrangement of boxes and saddles would prove to be both unsightly and unnecessary, short lengths of conduit not exceeding 1 m in length between boxes need not be secured further than by connection to the adjacent boxes. In such cases the D.R. reserves the right to insist upon additional fixing being provided, should he for any reason whatsoever consider such additional fixing necessary.

Where two or more lines of conduit run parallel to each other, on the surface of walls, etc., the distance between them shall not be less than 15mm and conduits shall not cross.

Conduit shall be installed in such a manner as to prevent interference with other services and shall be kept at least 180 mm clear of gas or water pipes, and heat in excess of 68 degrees C.

A means of expansion shall be provided in conduit runs in excess of 6 m without any bend or set, by use of 'Egetude' expansion couplings, which shall also be used at building expansion joints.

Conduit cast-in-situ shall be frequently secured to the steel reinforcement work, with heavy binding wire to prevent movement of the conduit and conduit boxes during the pouring and vibrating of the concrete. Outlet boxes shall be securely fixed to the shuttering with nails, or by means, which shall be visible as a marker on removal of the shuttering only where marks can be concealed. Conduit shall be installed after the first grid of steel reinforcement work is securely fixed and all open ends of conduits shall be protected by couplings plugged with a suitable non-metallic stopping plug. The number of right angle bends in conduit cast-in-situ shall not exceed two between boxes.

Immediately prior to installation the wiring all conduit and fittings shall be dried and cleaned out by drawing through a cloth swab. Rawl plugs shall be used for fixing to brickwork, self-tapping screws for fixing to aluminium section, raw nuts, raw-anchors spring toggles, gravity toggles or rawlbolts, shall be used for fixing to other materials as approved by the D.R.

Corners shall be turned by easy bends or sets made in accordance with the manufacturer's instructions without altering the section or splitting conduit.

9. **CIRCULAR INSPECTION**

Boxes will not be permitted in floors unless approved. Boxes cast-in-situ must face downwards from the ceiling/floor section. Small standard circular non-metallic conduit boxes, conforming dimensionally with B.S. 31/1940 with standard circular non-metallic (4mm) lids and nylon fixing screws, shall be provided and fixed at all junctions.

The above circular boxes or equivalent looping boxes shall be provided and securely fixed for all ceiling points. When the conduit is run on the surface, all circular boxes for ceiling points shall be fixed with screws.

Where ceiling roses occur and the ceiling box is recessed below the finished level of the ceiling, suitable extensive rings to accommodate the ceiling rose must be provided. Where ceiling boxes, including extension rings, are flush with the ceiling surface, break joints rings shall be provided to hide the joints.

Where a non-metallic outlet box of thermoplastic material is used for the suspension of a lighting fitting, care shall be taken to ensure that the temperature of the box does not exceed 60 degrees c. The weight suspended from the box shall not exceed 3 kg.

Where 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 circumstance 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 other insulating substance shall be removed from the screw threads. Where conduits terminate in fuse-gear, distribution board, adaptable boxes, non-spouted switchboxes, etc., they shall, unless otherwise stated, be connected thereto by means of smooth bore male brass brushes, compression washers and sockets. All exposed threads and abrasions shall be painted (using an oil point for black enamelled tubing and 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 15 m. No tees, elbows, sleeves, either of inspection or solid type, will be permitted.

Conduit throughout shall be of sufficient section and so arranged with draw-in boxes to allow easy drawing in and out of any one or all of the cables in the conduit.

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

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

Conduits installed and buried in walls shall allow a minimum of 15 mm cover. These conduits and those cast-in-situ concrete slabs shall be given one coat of rust prevention paint before installation of conduit and before concrete is placed. Sunk circular conduit boxes shall be provided with break joint rings of white moulded material or metal.

Surface conduit shall be run in square symmetrical lines and shall be marked on site for approval before installation. Conduits shall be fixed by means of distance saddles spaced at not more than 1.2 m for 20mm and 50mm conduit and 1.5 m for larger sizes. Conduits shall be fixed each side of conduit boxes at a distance not exceeding 250 mm, and the saddles shall be equally spaced.

Where conduit runs enter specified areas requiring flameproof equipment, barrier boxes shall be inserted immediately before the conduit enters the flameproof area.

All conduit installed within this area shall be solid drawn galvanised, as shall be conduit fittings and accessories and Buxton Certified as suitable for Group 11 Hazards. Equipment shall comply with B.S 229, B.S.S. 889, and Code of Practice C.P. 1003. In no case shall conduits from different distribution boards be connected at one box, likewise cables from different distribution boards shall not be housed in the same conduit specified.

All conduit boxes, except loop-in pattern concrete floor shall be fixed direct to the structure apart from the support provided by the conduits. Box lids where required shall be heavy gauge metal, secured by means of zinc plated or cadmium steel screws. All adaptable boxes and lids of the same size shall be interchangeable.

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

Draw-in boxes in the floor are generally to be avoided but where they are essential they must be grouped in positions approved by the D.R. and covered by suitable floor straps, with non-ferrous tray 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 fillings of all covers, but the fillings in materials will be supplied and the filling shall be carried out by the Main Building Sub-Contractor.

Where it is intended to fix enclosed lighting fittings directly to a box to suspend a fitting of weight in excess of 3 kg., Egetude steel insert clips shall be used.

10. **SWITCH AND SOCKET OUTLET BOXES**

All boxes intended for switches, socket outlet or other outlets shall be fitted with brass ferrules to accommodate fixing screws.

11. **STOPPING PLUGS**

All spare ways in junction boxes, etc., left for possible future extensions shall be fitted with the stopping plugs.

12. **EARTHING**

Where fittings and accessories require earthing, an earth continuity conductor be run through the conduit. The earth continuity conductor shall be a green coloured PVC insulated copper wire of minimum size 2.5 sq. mm and shall be continuous between terminals. Where the earth terminal is formed by a brass screw and washer, "Ross Courtney" type terminations shall be used. All switch, socket outlet, ceiling boxes etc., shall be supplied with an earth terminal.

13. **EARTH CONTINUITY**

Each final sub-circuit that is required to be earthed shall be provided with its own individual earth continuity conductor which shall be run from a terminal on the earth bar in the distribution board or consumer's control unit protecting any particular final sub-circuit.

PART E:

**TECHNICAL SPECIFICATIONS
FOR A NEW 300 KVA SOUND-PROOFED
STANDBY GENERATOR SET**

PART E: TECHNICAL SPECIFICATIONS FOR SUPPLY AND INSTALLATION OF A NEW 300KVA SOUND-PROOFED STANDBY GENERATOR AND ANCILLARY WORKS

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SUPPLY AND INSTALLATION OF A NEW 300KVA SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED ANCILLARY WORKS

TECHNICAL SPECIFICATIONS

1. SCOPE OF WORKS AND SERVICES

- 1.1 The work covered by this specification includes the supply, delivery, installation, setting at work, commissioning to the satisfaction of the Architect/Engineer and maintenance for a period of twelve months, of one Diesel Engine Generating Set complete with all necessary auxilliary equipment and as indicated.

2. RELATED DOCUMENTS

- 2.1 The specification shall be read in conjunction with the Preliminaries, conditions of contract and any supplementary specification(s), schedule(s) and drawing(s) issued with it and enumerated in the invitation to tender. In the event of a discrepancy between this specification and any drawing issued with it or forming part of the contract the drawing shall be followed.
- 2.2 The words 'as indicated', 'where indicated', 'unless otherwise indicated' refer to items or requirements indicated elsewhere in the tender documents issued in connection with the contract e.g. on a drawing, in a supplementary specification or in Schedule 1.

3. REGULATIONS

- 3.1 The equipment shall comply with all relevant statutory standards and regulations current at the date of tender (unless otherwise indicated) and in particular the following:
- 1) I.E.E. Regulations for the Electrical Equipment of Buildings.
 - 2) Regulations under the Electrical Power Act.
 - 3) Factories Act.
 - 4) Any special regulations issued by the local Electricity or Water Undertakings.

4. STANDARDS

- 4.1 The equipment and all components shall comply with all relevant British Standards and Codes of Practice or other equal and approved standard specifications and codes. Where the equipment or part of it complies with other internationally recognized standards which are less stringent than British Standards or Codes or Practice, then the difference is to be stated in writing and must accompany the tender submission.

5. OPERATING CONDITIONS

- 5.1 The equipment and all components shall be suitable for operation in ambient conditions of 5° to 40° centigrade and up to 100% relative humidity in an unheated ventilated building.
- 5.2 All ratings of equipment and components shall be interpreted as site ratings and NOT sea level or other ratings. Details of the site are given in Schedule 1.
- 5.3 Contractor is deemed to have visited the site and if unable to locate it to apply to Feradon Associates, P.O. Box 7375-00300, Nairobi, for directions to enable him to do so. The Sub-Contractor is deemed to have acquainted himself therewith as its nature, position, means of access, etc., and no claim in this connection will be allowed. No claim will be allowed for travelling or other expenses which may be incurred by the Sub-Contractor in visiting the site or preparing a tender for the contract works, and subsequent site visits to be called by the Architect during the contract period.

- 5.4 The set shall be capable of operating continuously and satisfactorily in a medium dust laden atmosphere as defined in BS 1701 and in accordance with BS 5514.

6. FUNCTIONAL REQUIREMENTS

- 6.1 As specified in Schedule 1, the set shall be used for emergency operation (standby power operation). It shall be possible to start, operate and stop the set manually independently of any automatic features.

- 6.2 Within the operating conditions specified (Section 5) the set shall be capable of starting and accepting full load within the shortest possible time and in any case not more than 10 seconds. Any special features included to achieve this shall be stated in Schedule 2.**

7. PERFORMANCE

- 7.1 The output rating of the set in kVA, the voltage, the number of phases and the frequency shall be as specified in Schedule 1.

- 7.2 Within the operating conditions specified, each set, equipped with its standard air intake filters, shall be capable of delivering its rated output continuously at rated voltage and 0.8 lagging power factor and of delivering 10% in excess of the continuous maximum for a period of one hour in any 12 hour period.

- 7.3 The steady state voltage shall be maintained within 2½% of the rated voltage under the control of the voltage regulator between the cold start ambient conditions and the maximum working temperatures, at any load from no load to 10% overload and from unity to 0.8 lagging power factor. After any change of load the voltage shall not vary by more than plus or minus 15% of the rated voltage and shall return to within plus/minus 3% within 3 seconds and to within plus/minus 2.5 % of rated voltage within 15 seconds. On starting the voltage overshoot shall not exceed 15% and shall return to within 3% in not more than 3 seconds.

- 7.4 The governing of the set shall be such that the steady load speed band shall not exceed 1% of rated speed. Sudden removal of the full load at rated frequency shall not cause the frequency to rise above 10% of rated frequency and it shall return to within 5 % of rated frequency within 3 seconds. The resultant steady state frequency shall return to 4% within 15 seconds. If full load is then reimposed the frequency shall not fall below 94% of rated frequency and shall return to 99% within 3 seconds and to the rated frequency within 15 seconds.**

- 7.5 The cyclic irregularity of the set at full load shall not be worse than 1/150.

- 7.6 The deviation of the waveform of the voltage output from a pure sine wave shall not exceed the limits specified in BS 2613.

- 7.7 Radiated interference shall be suppressed to the limits specified in B.S. 800 and B.S. 833.

8. SET ARRANGEMENT

- 8.1 The set and its auxiliaries shall be mounted on a sufficiently substantial underbase. All items which must be held in correct relative alignment shall be located by means of dowels.

- 8.2 The set shall be designed and supplied for operation bolted to the floor on robust antivibration and shock absorbing devices.
It shall have adjusting screws for optimum setting and levelling and be so designed and installed that no appreciable engine vibration shall be transmitted to the floor or to any surroundings.

- 8.3 A new generator house will be constructed. The Sub-Contractor shall provide early enough full details of fixing requirements, and any modifications that may be necessary for the proposed house and foundation. Particularly, the Sub-Contractor appointed to supply the generator must confirm if the proposed house is adequate for the generator in terms of height, length, width and provision of natural ventilation. The Sub-Contractor will be responsible for the cost of modifying the generator house if he fails to provide the above information immediately.

The Sub-Contractor shall however provide means for bolting down the set. If the plinth provided is not sufficient the Sub-Contractor shall arrange to extend it to the Architect's satisfaction.

- 8.4 Bearings shall be suitable for operation over long periods without the need for replacement of the lubricant. Oil lubricated bearings shall be fitted with a visible oil level gauge.

9. DIESEL ENGINE

- 9.1 The engine shall be designed for satisfactory operation on fuel oil complying with BS 2869 Class D and the lubricating oils stated in Schedule 2.

- 9.2 The governor shall control the frequency with the limits stated in Section 7.4. Manual speed adjustment shall be provided over a range $\pm 5\%$ of the rated speed at any load.

- 9.3 The engine shall be totally enclosed, with forced lubrication from an integral pump having on the suction side a coarse strainer and on the delivery side a dual 'full flow' fine filter fitted with a changeover cock incorporating pressure by-passes, so that the oil flow to the engine is maintained if the filter should chock.

Alternatively a single filter of the self-cleaning type fitted with a by-pass relief valve and having the same filtration performance may be provided. The capacity of the lubricating oil system shall be sufficient to enable the engine to run continuously for 72 hours.

- 9.4 A filter fitted with by-pass relief shall be inserted in the fuel line immediately before the pump(s). The fuel filter element shall be incapable of passing particles larger than 5 micrometers. The fuel system shall be so arranged that fuel resulting from filter, pump or pipe spillage shall be incapable of entering the engine pump.

- 9.5 Air filters complying with BS 1701, Grade 'A' or Grade 'B' suitable for use in a medium atmosphere shall be fitted on the engine air intake(s).

- 9.6 No significant critical speed of the complete shaft system, including the generator, shall be within 15% of the rated speed.

- 9.7 A manually reset overspeed trip shall be fitted to stop the engine if its speed exceeds the rated speed by 15%. A mechanical trip is preferred but an electrical overspeed trip may be offered. Both types shall be equipped with a pair of contacts which close on operating of the trip. If the device is belt driven, at least two belts shall be provided and the drive shall be capable of carrying full load with one belt removed.

- 9.8 The set shall be arranged such that on shut-down the cooling water temperature shall not rise with residual heat so that the high water temperature lock-out operates (Section 23.1 (4) (a)).

- 9.9 The engine shall be naturally aspirated as indicated in Schedule No. 1.

- 9.10 Starting shall be by means of electricity supplied from a starter battery. The starter motor shall be of the axial type, de-energised by a device operated from the engine.

- 9.11 Suitable means shall be provided for turning by hand the engine main shaft and the associated generator to facilitate inspection and overhaul. A means of manual starting is to be provided as indicated in Schedule No. 1.

- 9.12 The engine shall be capable of being started from any crank position.

- 9.13 A thermostatically controlled 240 - volt immersion heater may be fitted in the engine lubricating oil sump to facilitate starting. The heating surface loading of any lubricating oil heater(s) shall not exceed 0.015 watt per sq. millimetre to avoid carbonisation of the oil.

9.14 An efficient exhaust silencer with adequate draining facilities shall be supplied, and as indicated in Schedule 1 shall be installed in the generator house with the exhaust discharge into the steel chimney. The exhaust silencer shall be so arranged that it may be readily relocated if required.

10. FUEL STORAGE TANK

- 10.1 The fuel storage tank shall be located close to the building and in the current Kenya laws relating to fuel storage close to buildings or be mounted on a plinth, which shall be properly fenced. Type of location is given in Schedule 1.

A minimum capacity of the tank shall be as per schedule 1. The tank shall be fitted with a hand operated fuel transfer pump and the necessary piping to allow the transfer of fuel from it to the daily service tank.

- 10.2 A three-way cock shall be fitted in the line from the tank to the engine to enable fuel to be supplied from a source other than the fuel tank. The position of the cock shall be clearly marked "TANK", "OFF" and "AUXILLARY".
- 10.3 The daily service fuel tank shall be equipped with a clearly visible plastic tube fixed vertical on its side to enable the level of the fuel in the tank to be seen readily. In addition to that it shall be supplied with drain, vent, overflow and inlet and outlet connections.

11. ENGINE INSTRUMENTS

- 11.1 The following instruments shall be provided:

- 1) a lubricating oil pressure gauge
- 2) a tachometer
- 3) a water thermometer
- 4) an exhaust gas pyrometer or thermometer mounted near the manifold.
- 5) lubricating oil thermometers on the inlet to and outlet from the engine, when a lubricating oil cooler is fitted.

12. COOLING SYSTEM

- 12.1 The engine shall be both air cooled and water cooled as indicated in Schedule 1.

13. AIR COOLING OF ENGINE

- 13.1 Cooling air for the engine and lubricating oil shall be provided by fan(s) mechanically driven from the engine. The cooling system shall be adequate for the total requirements of the engine when running on continuous full load and on 10% overload for one hour in accordance with BS 5514 and under the conditions of Section 5.

- 13.2 The engine shall be so designed that the cooling air discharges into or is drawn through a reasonable airtight ducted assembly enclosing the lubricating oil cooler, the cylinder barrels and the cylinder heads of the engine.

This assembly shall terminate in a flanged outlet to which trunking shall be readily attached, to enable hot air from the cooling system to be ducted and discharged outside the building together with exhaust.

Belt driven fans shall have at least two belts and the drive shall be capable of transmitting the full load with one belt removed. The cooling air temperature shall be controlled so as to maintain a safe working temperature of the cylinder head(s) and the engine shall shut down if the maximum is exceeded (see section 22.1 (4) (b)).

14. WATER COOLING OF ENGINE

14.1 A radiator of the air blast type shall be provided. It shall either have separate section for water and for lubricating oil or be arranged for jacket water cooling only.

14.2 Belt driven fans shall be provided with at least two belts and the drive shall be capable of transmitting the full load with one belt removed.

14.3 Circulation of the jacket water and lubricating oil through the respective radiator sections and/or heat exchanger shall be by means of pumps mechanically driven by the engine. Belt driven pumps shall be provided with at least two belts and the drive shall be capable of transmitting the full load with one belt removed.

14.4 An easily visible flow indicator provided with contacts shall be fitted in the water outlet from the engine; the contacts shall close in the 'no-flow' condition and shut down the set.

Alternatively in thermosyphon systems and scaled or pressurised radiator systems the flow indicator may be dispensed with providing the engine shuts down by the operation of the high temperature or low oil pressure safety devices in accordance with Section 22.1.

14.5 A thermostatically controlled diverter valve shall be inserted in the engine water discharge pipe with a return to the circulating pump section, to maintain the circulating water at the optimum temperature irrespective of load. Alternatively a thermostatic by-pass will be accepted.

14.6 A radiator makeup/expansion tank, fitted with float control inlet shall be provided. If a sealed or pressurised unit is offered the tank may be dispensed with.

14.7 Where indicated in Schedule 1 provision shall be made on the radiator framework to permit the attachment of ducting for the discharged air.

14.8 A thermometer shall be mounted near the cylinder head(s) to indicate water temperature. Where a lubricating oil cooler is fitted, inlet thermometers shall be mounted at the oil to and outlet from the engine. Alternatively, thermocouples may be provided at all thermometer positions and taken out to an instrument panel.

14.9 Adequate drains shall be provided at low points in the water and lubricating oil systems of the radiator and, where applicable, of the heat exchanger.

15. ALTERNATOR AND EXCITER

15.1 The alternator shall be directly coupled to the engine and be sized such that it will accept the maximum output of the engine including overload.

15.2 Where the alternator is of the rotating armature type a slipring shall be provided for the neutral.

15.3 The alternator shall be capable of operating within the range of $\pm 5\%$ of the nominal voltage according to the setting of the automatic voltage regulator.

15.4 Three-phase machines shall be star connected, and a diagram showing the terminal markings and phase rotation shall be provided in the terminal box. Cables connecting the machine winding and machine terminals shall not have a higher derating factor for temperature than the windings.

15.5 Machines shall be both clean protected and drip proof. Overall drip proof covers will be accepted.

15.6 The insulation shall comply with BS 2757 excluding Classes Y and A. The insulation shall have an oil, moisture and fungus proof finish, with a surface which will not retain dust or condensation, it shall be possible to put the set in service after long periods, in unheated storage without the necessity for drying up the insulation.

15.7 The alternator shall be capable of withstanding a short circuit for three seconds when under the control of the automatic voltage regulator.

16. **EXCITATION**

Alternators using exciters with commutators shall be designed for an excitation voltage of full load of not less than 50 volts unless prior approval is given.

16.2 Where rotary exciters are fitted they may be direct coupled or driven by Vee-belts or chains. The speed of belt or chain driven exciters shall not be within 5% of a multiple of the alternator speed. Vee belt drive shall have at least two belts and shall operate satisfactorily if one belt is removed. Special attention shall be given to ensure satisfactory commutation, brush life and freedom from voltage drift. The neutral and running, positions of the brushes shall be clearly marked.

16.3 If static excitation and/or control system are offered, a description of the equipment and method of operation shall be submitted for approval.

17. **ELECTRICAL CONTROL PANELS**

A control panel shall be provided to accommodate the following:

- 1) An automatic voltage regulator
- 2) A hand field regulator and a 'HAND AUTO' switch
- 3) An alternator field switch
- 4) Meters (Section 21)
- 5) A neutral earthing link
- 6) A change - over - Contactor

18. **AUTOMATIC VOLTAGE REGULATOR**

The automatic voltage regulator shall be of a type which will maintain its adjustment for long period without attention. It shall be provided with an adjustment for setting the level of the controlled voltage to within $\pm 5\%$ of the nominal voltage.

19. **HAND FIELD REGULATOR**

19.1 The hand field regulator shall give stable control of the voltage from 90% of the normal voltage at no load when cold to normal voltage at 10% over-load when hot, under the specified operating conditions.

If a static excitation system is offered which does not permit the use of a hand field regulator this shall be stated in the Tender together with performance details.

19.2 If the hand field regulator must be left in a precise position when the set is under the control of the automatic voltage regulator then this position shall be clearly marked.

20. METERS

The following meters shall be provided. They shall comply with BS.89, Table 7.

- 1) One maximum demand ammeter in each line
- 2) One voltmeter, and a selector switch to read line to line and line to neutral voltages.
- 3) A frequency meter
- 4) A field ammeter
- 5) Maximum KVA meter and Kilowatt hour meter.

21. AUTOMATIC STARTING PANEL

- 21.1 Automatic starting panel shall be provided which shall contain all necessary equipment for controlling the automatic starting and stopping of the set, lubricating oil priming (if necessary), auxiliaries, fault warnings and shut-downs. All faults, warnings and shut-downs shall be separately indicated. There shall be test facilities for indication lamps etc., preferably by means of a single test button.
- 21.2 Means shall be provided for isolating all supplies to the starting panel either by an isolating switch or by withdrawable fuses. For external use, a 24 volt battery supply from fused outlet terminals shall be provided only when the engine is running and in service (see Section 28.3).
- 21.3 The starting and control circuits shall be rated at 2 amps at the control circuit voltage.
- 21.4 A selector switch shall be fitted having three positions as follows:
 - 1) 'Local' In this position it shall be possible to start and stop the set by push buttons mounted on the panel.
 - 2) 'Remote' In this position the set shall be capable of being started and stopped from a remote circuit.
 - 3) 'Off' In this position all the automatic features shall be inoperative.
- 21.5 When the set is stopped other than under lock-out conditions it shall be self resetting, ready for the next start.
- 21.6 In the 'Off' position (Section 2.4 (3)) or with the automatic equipment disconnected, the set shall be suitable for starting by manual means, e.g. by cranking or direct operation of the starter solenoid.
- 21.7 All switches and push buttons shall be clearly marked to indicate their function.
- 21.8 It shall be possible to operate the "Start and Stop" buttons and the three-position switch and to see the "Set Failure" indications without opening the panel doors.

22. AUTOMATIC CHANGEOVER CONTACTOR UNIT

- 22.1 Where the functional requirements (see Section 6) indicate the set is to be used for automatic standby or mains failure duty a contactor unit shall be provided which on failure of the normal electricity supply will automatically initiate the starting of and effect the transfer of load to the standby generator.
The unit shall be incorporated in the Automatic Starting Panel (see Section 21).
- 22.2 Where failure of the normal supply is referred to, it shall be defined as the complete loss of voltage or the falling below 85% of the normal voltage between any two lines or line and neutral.
- 22.3 The power circuit shall consist of two contactors feeding the distribution branch to which the load will be directly connected. One contactor shall control the normal supply, the other the standby supply, they shall be electrically and mechanically interlocked so that they cannot both be closed at the same time.
- 22.4 On the failure of the normal supply (Section 22.2) the unit shall operate in the following manner:-

- 1) After a delay, adjustable from 0 to 5 seconds (to avoid operation by a transient dip in voltage) a signal shall be given to start the standby generating set.
 - 2) On receipt of a signal from the standby generating set that it is ready to take the load, and providing that the failure of the normal supply still persists, the normal supply contactors shall open and the standby contactor shall close. If the normal supply has been restored before the changeover has taken place, the contactors shall not operate and the starting relay contacts shall open to initiate the shutting down of the standby generating set.)
- 22.5 When the standby supply is in operation and the normal supply is restored and remains within 10% of rated voltage on all phases for a pre-set time (adjustable upto to 30 seconds) the standby contactor shall open and the normal supply contactor shall close; the starting relay contacts shall then open to shut down the standby generating set.
- 22.6 Provision shall be made so that automatic return to normal supply can be prevented if required (Section 22.9 (s)).
- 22.7 Once a start signal has been sent to the standby generating set the engine starting sequence shall be allowed to continue until the set is ready to take the load before a stopping signal is sent.
- 22.8 By the additional external connections the following facilities shall be available:-
- 1) Remote starting of the standby generating set and transfer of the load to it.
 - 2) Restoration of the normal supply on failure of the standby generating set.
- 22.9 Each switch shall be labelled with its duty and each position shall be marked. The following switches shall be provided and fitted:-
- 1) A Contactor Control Switch with make before break contacts and 'Hand' and 'Auto' positions. In the 'Hand' position the unit shall be controlled by the 'Contactor Hand Control Switch' (Section 23.9 (2)). In the 'Auto' position the unit shall operate automatically irrespective of the position of the 'Contactor Hand Control Switch'.
 - 2) A Contactor Hand Control Switch with 'Standby' and 'Normal' positions. This switch shall enable either contactor to be closed when the 'Contactor Control Switch' is in the 'Hand' position.
 - 3) An Auto Return Switch having 'On' and 'Off' positions. In the 'On' position the return to normal supply shall be automatic when the normal supply is restored. In the 'Off' position the standby supply contactor shall remain closed when the normal supply is restored.
 - 4) Contactor By-Pass Switches shall be provided to enable the essential load circuits to be served direct from the normal supply to enable the generator and/or the control equipment to be serviced. The by-pass switches shall be provided with a suitable and conspicuous label warning against leaving the generator in the disconnected position.
- 22.10 Indicating lamps or illuminated panels shall be provided on the front of the panel. They shall be appropriately labelled, easily visible and shall give the following information:
- 'Normal Supply Available'
 'Standby Supply Available'
 'Normal Supply in Use'
 'Standby Supply in Use'
- 22.11 A push button labelled 'Test' shall be provided to enable a failure of normal supply to be simulated. If the button is pressed and released the equipment shall complete the starting sequence, and when the set is ready to take load it shall be shut down. If the button is held depressed the equipment shall change over to the standby supply when the set is ready to take load.
- 22.12 The control circuit supply will be either 12 volts d.c. or 24 volts d.c. depending upon the starting battery and charger (see section 28).

No current shall be drawn from the control supply when the unit is accepting the normal power supply.

23. LOCK-OUT

23.1 The set shall stop and lock out to prevent further starting when:

- 1) It fails to start when the electric starter motor has been in operation for 20 seconds under automatic start conditions;
- 2) The lubricating oil pressure falls to a value at which it would be unsafe to continue running the engine;
- 3) The cooling water does not flow, where the engine is fitted with a visible flow indicator on the cooling water system.
- 4)
 - a) in water cooled engines the cooling water temperature exceeds a predetermined limit
 - b) in air cooled engines the cylinder head temperature exceeds a safe maximum
- 5) The overspeed trip has operated.

23.2 Failure of the circuits concerned in sub-sections 23.1(2) to 23.1(5) shall not cause a set to shut down.

24. FAULT INDICATION

Each lock-out detailed in Section 23.1 shall be indicated by a lamp on the panel together with an indication of the fault causing the shut-down. The fault warning lights shall be set to operate before the lock-out.

25. LOCK-OUT REMOTE INDICATION CIRCUIT

Where indicated in Schedule 1, an auxiliary circuit suitable for 2 amps 50 volts d.c. and 1 amp 250 volts a.c. shall be provided with a contact which is open when the set is available and closed when it is locked-out. This lock-out circuit shall be connected to terminals for the connection of external wires to provide remote indication of lock-out.

26. LOCK-OUT RESET

Reset of the lock-out shall be by hand.

27. FIRE SERVICE TERMINALS

27.1 Where indicated in Schedule 1 an emergency stop circuit shall be provided with terminals marked FS1 and FS2. These terminals shall be initially fitted with a link and are for optional connection to a remote fire switch. Opening of this circuit shall stop the set if it is running, and as long as the circuit remains open the set shall be incapable of being started by 'Hand' or 'Automatic' control. This circuit shall be self-resetting so that the set is available for automatic starting when the circuit is restored.

27.2 Terminals shall be provided in the battery circuit for optional connection to a fire service battery switch. Opening of this switch shall isolate the control circuits from their supply.

28. STARTING BATTERY AND CHARGER

28.1 The battery shall be either 12 or 24 volts and capable of withstanding the loads imposed upon it by its specified duties. It may be of lead-acid or alkaline type and shall be of sufficient capacity for four starts in succession once in an eight-hour period. Auxiliary circuits connected to the battery shall be protected by fuses.

28.2 The battery shall be used to supply any automatic starting and control equipment, and relay operation shall not be impaired when the battery is supplying current to the starter motor.

- 28.3 A single phase supply for battery charging shall be available from the set when it is in service, and where circumstances permit, from an external supply (Section 17(9)).

A charger shall be provided which will recharge the battery after engine starting and maintain it in a charged condition when the set is standing or is in service. It shall also supply the load of any automatic starting and control equipment, and any additional load upto 24 volts level when the set is running and in service. An alternative quick charge rate shall be provided. The charger shall be fitted with an ammeter to measure the charge and discharge current excluding the starter motor current.

9. WIRING

Power cables and small wiring cables interconnecting major components shall be of the heat and oil resistant type and shall be metal sheathed or run in metal ducts or metal conduit, which shall be flexible where appropriate. All cabling and small wiring shall be coded and terminated with lugs or be soldered; the terminations shall be clearly marked with the numbers and letters of terminals to which they are connected. Terminals shall be numbered or lettered, easily accessible and fitted with individual insulating barriers or adequately spaced barriers shall be fitted to separate control terminals from power wiring terminals.

30. EARTHING AND EARTH FIELD

- 30.1 All metal work housing electrical equipment shall be bonded to a brass earthing terminal of not less than ISO bolt M10.
- 30.2 Where indicated in Schedule 1 an earth field is to be provided suitable for requirements.

31. CONTACTORS

Contactors shall have magnetic circuits designed for a.c. or d.c. operation and shall be rated in accordance with BS 775 for Uninterrupted Duty and Utilization Category AC4. Four-pole contactors shall be fitted for three-phase equipment and two-pole contactors for single phase equipment. Main and auxiliary contacts shall be silver faced or better.

32. RELAYS

- 32.1 Relays shall preferably be of the sealed type mounted in approved plug-in bases with spring loaded retainers but if this is not practicable they shall be mounted on individual sub-bases and wired so that easy access is obtained to soldered connections. Unsealed relays shall be enclosed in individual or common dust protecting cases.
- 32.2 Time delays, if of the pneumatic type, shall operate on filtered air. The thermal type of time delay relay will not be accepted.

33. FUSES

Fuses shall comply with BS 88, category of duty AC 46, fusing factor class A1. A spare fuse cartridge for each pole shall be mounted inside each equipment.

34. RECTIFIERS AND CAPACITORS

- 34.1 Rectifiers and capacitors shall be suitable for any transient voltages likely to be encountered during the operation of the equipment and for the internal operating temperature of the enclosures at the specified maximum external ambient temperature.
- 34.2 Electrolytic capacitors will not be accepted unless approved for a specified purpose.

35. ENCLOSURES FOR ELECTRICAL AND CONTROL EQUIPMENT

Enclosures for electrical and control equipment shall be drip proof and dust protecting, with adequate front and rear access as necessary for maintenance and repair. Special attention shall be given to the method of construction and to the mounting of the components to minimize the effect of vibration. Diagrams of connections in durable form shall be mounted inside the enclosures.

36. GUARDING

All live and moving parts shall be adequately guarded to prevent injury to personnel.

37. INFORMATION PLATES

A non-ferrous metal rating plate shall be fixed on the front of the alternator control panel door, giving the following information:

Continuous output		KVA at 0.8 p.f.
Voltage	V	-phase - wire
Frequency	Hz	Speed rev/min
Control Supply	v.d.c	Maker's Serial Number
Year of supply		

38. DANGER PLATES

Since this set is automatically started a reversible plate 400 x 250 mm shall be fixed by screws in a prominent position on each side of the set. One side of the plate shall be blank and painted the same colour as the set; the other side of each plate shall be signal red (BS 2660, colour 0-006) with the following inscription in white.

**DANGER
THIS MACHINE IS AUTOMATICALLY CONTROLLED
DO NOT WORK ON IT UNTIL
STARTING EQUIPMENT IS ISOLATED
OR DISCONNECTED AND CAUTION
NOTICES ARE DISPLAYED**

39. TROPICALISATION OF COMPONENTS

All components shall be fully tropicalised and protected against mould growth.

40. FINISH

- 40.1 All ferrous metal works shall be either painted or processed to give a rust proof coating.
- 40.2 Ferrous metal work to be painted shall first be either shot blasted or thoroughly wire brushed to remove all scale and oxide and immediately given one brushed coat or two sprayed coats of primer. After not less than 4 hours, one brushed or two sprayed undercoats followed by one brushed or two sprayed finishing coats of heat and oil resisting quality paint shall be applied.
- 40.3 Successive coats of paint shall be of slightly differing shades. Interior surfaces of electrical equipment enclosures shall be finished white and all external surfaces shall be finished grey (BS 2660, colour 9-097). Engine crank cases shall not be painted internally unless the paint is resistant to the lubricating oil.

41. MAINTENANCE MANUAL

- 41.1 Upon Practical completion of the Works the Sub-Contractor shall furnish to the Engineer four copies of a Maintenance Manual relating to the installation forming part of all of the Works.
- 41.2 The Manual shall contain full operating and maintenance instructions for each item of equipment, plant and apparatus set out in a form dealing systematically with each system. It shall include as may be applicable to the Sub-Contract Works the following and any other items listed in the text of the Specification hereinafter.
- 1) System Description
 - 2) Plant
 - 3) Valve Operation
 - 4) Switch Operation
 - 5) Procedure of Fault Finding
 - 6) Emergency Procedure
 - 7) Lubrication Requirements
 - 8) Maintenance and Servicing Periods and Procedures
 - 9) Colour coding Legend for all Services
 - 10) Schematic and wiring Diagrams of Plant, Apparatus and switchgear.
 - 11) Record Drawings, true to scale, reduced to International A4 size.
 - 12) Lists of Primary and Secondary Spares.
- 41.3 The Manual is to be specially prepared for the Contract Works, and Manufacturers' standard descriptive literature and plant operating instruction cards will not be accepted for inclusion unless exceptionally approved by the Engineer. The Sub-Contractor shall, however, affix such cards, if suitable, adjacent to plant and apparatus. One spare set of all such cards shall be furnished to the Engineer.
- 41.4 Manuals shall be printed on good quality paper preferably International A4 size and shall have stiff covers of durable material. The maker's name and the rating of the set shall appear on the front covers.

42. DRAWINGS

The Sub-Contractor shall provide to the Architect four sets of the following drawings:-

- 1) Where indicated, a building drawing showing details of cable entries, pipe entries and ducts required, and the exhaust system.
- 2) A general arrangement drawing showing the principal dimension and weight of the set.
- 3) A general arrangement of the diesel engine.
- 4) A general arrangement of the alternator and exciter showing terminal markings, polarity and phase rotation.
- 5) A general arrangement of the electrical control panel(s).
- 6) A schematic and wiring diagram of the electrical control panel(s).

43. WORK TESTS

- 43.1 The set shall be tested as a unit at the manufacturers works (or else where by agreement) for output and performance generally in accordance with the requirements of BS 649 and BS 2613. The Engineer shall be given adequate notice in writing of the date and time of the works tests and he, or his representative shall if he so desires, be present at such tests and be given all reasonable facilities for his own inspections during the course of the tests.

43.2 Whether or not the Engineer or his representative attends the tests, he shall be furnished by the Sub-Contractor with copies of all relevant test certificates.

44. COMMISSIONING

44.1 The Sub-Contractor shall include for fully commissioning the set and its control equipment and, for the purpose of the required tests, shall provide all necessary instruments, tools, fuel and lubricating oil.

44.2 The following tests and checks as applicable shall be carried out by the Sub-Contractor in the presence of the Architect or his representative.

- 1) Check that the main frame is level in all directions, Engine and generator shafts are in proper alignment and the vibration absorbing devices are properly installed and located.
- 2) Check water and sump oil levels and that the water jacket and radiator heaters (if fitted) are in working order.
- 3) Check the battery electrolyte level and the specific gravity.
- 4) Examine the containers in which the fuel and lubricating oils were delivered and check that the types and grades of oils are as recommended for the units.
- 5) Ensure that sufficient fuel oil is in the tank for a two hours test run.
- 6) Check that all radiator and engine block water drain points are free from sludge and other blockages.
- 7) Check engine bolts, main drive coupling, valve clearances, fuel pump settings, governor settings, pipe line connections, water hose, exhaust couplings, flexible pipework etc., and where a separate cooling water tank is fitted, that the water level is satisfactory and the ball valve and over flow work.
- 8) Check all outgoing connections on the generator and at the control panel. All lugs for principal connections shall have clean and bright contact surfaces. A suitable abrasive material shall be used where necessary.
- 9) Check access panels and doors for proper opening and closing and for the functioning of any interlocks fitted.
- 10) With the set isolated from the main supply and the selector switch in the 'manual' position, start the engine by means of the 'start' push button and allow it to run upto normal speed. Check that during the time the engine starter motor is in operation, the mains battery charger is automatically switched off to avoid its being overloaded by the reduction in voltage across the battery. Where a battery charging dynamo is fitted, Check that the main battery charger is disconnected by the operation of the auxilliary Sub-Contactor during the time the engine is running.
- 11) Check instruments and gauges for normal operation and response and that the generator voltage is being maintained within the prescribed limits, making due allowance for no load conditions. Compare the reading of the frequency meter with that of the engine tachometer, where both are fitted.
- 12) Stop engine by turning selector switch to 'off' position and verify that generator contactor opens at between 95%. and 85% of normal voltage.
Re-check water and oil levels.

- 13) Turn selector switch 'to auto' position. Disconnect the sensing circuit supply and check that the set starts, the mains contactor opens, and the generator contactor closes in correct order.
Reconnect the sensing circuit to verify that the Engine stops on the restoration of the mains supply and the contactors operate correctly.

Check voltage sensing and time delays on each phase in turn and also that the push buttons for mains failure simulation and Engine stopping operate correctly.

NOTE: Running of the engine for any length of time under no-load conditions is undesirable and tests calling for such operation should be carried out in as short a time as possible consistent with thoroughness.

- 14) Operate the necessary isolators and switches to put the set on standby for the essential services network with the selector switch in the 'Auto' position, and using the mains failure simulation push, verify that the set operates correctly with the appropriate time delay for taking up load and that the carrying of the load and its distribution over the three phases are satisfactory.
- 15) Run the set at various loads for periods totalling at least 30 minutes. Check the voltage and current in each phase in turn and that the voltage and frequency are being maintained within the required limits with large alterations of loads.

Note the rate of charge on the dynamo ammeter with the engine running (if a dynamo is fitted) and the rate of charge on the battery charging ammeter with the engine stopped. Check against manufacturer's recommendation and adjust charging rates if necessary.

- 16) Check the operation of the turbo-charger unit(if fitted) and the colour of the exhaust gas at various loads.
- 17) Check that the various engine safeguards operate satisfactorily.
- 18) Check the vibration absorbing devices for proper operation and that the performance of all flexible connections both mechanical and electrical, are satisfactory.
- 19) When all tests are satisfactory and agreed with the Architect or his representative, the lubricating oil and water levels shall be finally checked, the fuel oil tank replenished and the set left in normal operating order.
- 20) An initial supply of all lubricating oils and greases shall be provided by the Sub-Contractor.
- 21) Additional lubricating oil shall be provided for recharging the engine sump once together with a supply of lubricating oils and greases to cover the normal use and servicing of the set during the 12 months maintenance period referred to in section 47.

45. **SPARE PARTS**

The Sub-Contractor shall submit with his tender a separate priced list of spare parts, including any optional extras which he recommends should be purchased for the set and its control equipment and which are not supplied as standard with the unit.

46. **TOOLS**

A complete set of tools and general and special testing equipment shall be provided, including grease and oil guns, necessary for the normal maintenance of the set and its controls. The tools shall of the best quality, the spanners being of chromevanadium steel and shall be contained in a suitable robust steel tool box with lid fitted with a lock and two keys. All tools and testing equipment may be used by the Sub-Contractor in the execution of the Contract works but will not be accepted as part of the Contract works unless they are handed over in clean and undamaged condition, in perfect working order and effectively in new condition.

47. **MAINTENANCE**

47.1 The Sub-Contractor shall maintain the complete set and associated control equipment forming the unit for a period of twelve of calender months from the date that the unit is put into commission and regular use.

47.2 During the maintenance period, the Sub-Contractor shall at his own expenses:-

- 1) Make good any defects in the unit and replace any parts that fail or show signs of weakness or undue wear in consequence of faulty design, workmanship or materials on notification of the defect.
- 2) Visit the site and with all diligence attend to any such defect that arises within 48 hours of receiving notification of the defect.
- 3) Carry out regular examination and serving of the unit at the intervals laid down by the manufacturer or every three months, whichever is the sooner; the service examination to include all necessary adjustments, greasing, oiling, cleaning changing of lubricating oils to keep the unit in sound and efficient working order.
- 4) Instruct the maintenance personnel in the proper operation, care and maintenance of the set and it's equipment.

47.3 If during the maintenance period the unit is or is likely to be out of use for a period greater that 48 hours, due to the unit or part thereof developing a defect attributable to faulty design, workmanship or materials, or due to neglect of maintenance by the Sub-Contractor, the Sub-Contractor shall at his own expense immediately provide and install on free loan a suitable temporary unit for use until the required repair or replacement has been satisfactorily undertaken and the original set (or its replacement) put into proper working order.

47.4 At the end of the twelve months period of maintenance the Sub-Contractor shall (in addition of the normal servicing work) carry out a comprehensive examination and test of the set and its auxiliaries, including the checking of the operation of controls and safeguards, to ensure that the unit is in proper working order and in satisfactory condition for handing over to the client whose representative shall be present at such examination and test.

Signed (as in form of Tender) _____

Name of Sub-Contractor _____

Official Stamp _____

Date _____

PART F:

APPENDICES TO

TECHNICAL SPECIFICATIONS

**KENYA REINSURANCE CORPORATION LTD
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR
SET AND ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU**

APPENDICES TO TECHNICAL SPECIFICATIONS

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KENYA REINSURANCE CORPORATION LTD

APPENDIX NO. 1: INFORMATION TO THE TENDERER

SPECIFICATION FOR SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU

INFORMATION TO THE TENDERER

Section	Item	Requirements
5.	Operating Conditions:-	
5.1	Site (address and details)	KISUMU
5.2	Altitude	1125 m asl
5.3	Temperature range humidity	As stated in Part E, Technical Specifications to operate in Unheated building
5.4	Dust conditions if not as stated	
6	Functional requirements	Automatic Mains failure
7.	Performance	300KVA,415/240V, 3-Phase ON SITE.
8.1	Set arrangement	
	Weather proof roof and removable side panels	Required
9.2	Remote governor control	Electronic governor required
9.9	Aspiration	Natural
9.11	Manual starting for sets larger than 35 kW	Required
9.15	Silencer Details of additional pipework and fittings if required	Required
10.1	Daily service tank	Required

APPENDIX No. 1 (Contd)

Section	Item	Requirements
10.2	Manual transfer pump	Required
10.3	Fuel storage tank (external)	Required
10.4	Fuel jettison cock, fuel tank	
11	Engine Instruments Details if not as stated	Required.
12.	Cooling system	Water/Air
14.2	Water cooling Radiator mounting	On engine
14.8	Provision for hot air ducting	Required
17. 18.	Electrical control panel 17(1) main switch 17(2) provision for parallel running 17(4) alternator field circuit 17(10) "exciter"	 Circuit breaker Not required Switch Not required
20(5)	Kilowatt meter	Required
25.	Lock-out remote indication circuit	Required
26.1	Service terminals	Required
30(2)	Earth field	Required
42(1)	Building drawings, as comments to issued drawings.	Required

APPENDIX NO. 2 FOR SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR SET AND ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU

INFORMATION TO BE SUPPLIED BY THE TENDERER

Item	Details
1.	Diesel Engine (Note that ONLY Perkins, Cummins and Caterpillar Engines will be acceptable)
	Make and type
	Bore
	Stroke
	Net continuous rating in HP (B.S. 5574)
	a) at sea level
	b) on site
	Speed
	Year this type put into service
	Total number sold
	a) World wide
	b) in East Africa
	c) in Kenya
	Supercharger: make and type number in use
	Thermometers: make and type
	Air cooling:-
	Quantity of air required
	details of ducting required
	Water cooling:-
	details of water cooling circuits

APPENDIX No. 2 (Contd)

Item	Details
Radiator: make and type	
length breadth height	
Heat exchanger: make and type	
Aspiration	
Quantity of air required	
2. Auxiliaries	
Lubricating oil circuits Filters Coolers Primary pumps Tachometer and drive Governor Special cold start devices Running hours meter Safety devices:- High temperature	
Low pressure (lubricating oil)	
Cooling water flow trip	
Over speed trip	
Speed sensing devices	
Lubricating oil thermometers:-	
Number	
position(s)	
Water thermometer:-	
position	
Starting battery and charger	
3. Lubrication	
Recommended oil(s)	

APPENDIX No. 2 (Contd)

Item	Details
4.	Alternator and Exciter
	Make and type
	Bearings
	Insulation (B.S. 2757)
	Quantity of cooling air required
5.	Electrical Control Panel
	Automatic voltage regulator:
	make and type
	where mounted (if not on panel)
	Control circuits and wiring diagrams
	Relays:-
	make and type
	method of delayed operation
	Meters: make and type
	Circuit Breaker: make and type
6.	Automatic Changeover
	Contactor Unit
	Dimensions
	Type and control switches
	Current drawn from
	control supply under
	standby conditions
	Type of mounting
	Contactor: make and type
	Relays : make and type
	Fuses : make and type

APPENDIX No. 2 (Contd)

Item	Details	
7.	Performance Data	
	Fuel consumption	
	Rated Output %	
	Fuel Consumption L /hr	
	110	
	100	
	75	
	50	
8.	Exhaust Fans	
	Type	
	Rating	
9.	Generator Set	
	Full Length	mm
	Width	mm
	Hieght	mm
	Weight	Kg

**KENYA REINSURANCE CORPORATION LTD
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-PROOFED STANDBY GENERATOR
SET AND ASSOCIATED ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU**

APPENDIX NO. 3 - DATA FROM THE TENDERER

1. Initial sound level measured in accordance with the N.E.M.A. standards (Must be less than 60 dBA at 1m) dBA

2. Means of vibrations dampers mounted on the generator set to prevent vibrations to be transferred from the generator set to the building

APPENDIX NO. 4

LIST OF TOOLS TO BE SUPPLIED WITH EACH SET

The following tools shall be handed over to the Client or Engineer before completion of the contract:-

Item	Description	Price	KShs.
1.	Metal tool box with lock and keys		
2.	Set of 8 No. Chrome vanadium ring spanners in sizes to suit the set		
3.	Set of 8 No. Chrome vanadium open-ended spanners in sizes to suit the set		
4.	Set of screwdrivers, 75 mm, 200 mm and 300 mm plus one 200 mm Philips type		
5.	One set of feeler gauges		
6.	One grease gun to suit greasing points		
7.	One oil can, trigger type		
8.	One Hydrometer and Plastic Filler bottle with pouring spout		
Total carried forward to Price Summary Schedule.			

The tenderer shall give below details of any special tools which he recommends should be purchased as an optional extra.

Item	Description	Price	KShs.

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 5

LIST OF SPARE PARTS AND LUBRICANTS TO BE SUPPLIED WITH EACH SET

The following items shall be handed over to the Client or Engineer before completion of the contract.

These items shall not be used by the Sub-Contractor to carry out his normal maintenance.

Item	Description	Price	KShs.
1.	Oil Filters - 3 Nos.		
2.	Air Filters - 3 Nos.		
3.	One injector to suit the set		
4.	One set of fan belts comprising..... belts		
5.	One set of indicator bulbs comprising bulbs		
6.	One set of indicator lenses comprising lenses		
7.	One overhaul kit		
8.	One set of fuses comprising..... fuses		
9.	One 200 litre drum of sump grade oil		
10.	One 2 kilogram tin of grease of grade		
11.	One 10 litre plastic container of distilled water		

The tenderer shall give below details of any other spares which he recommends should be purchased as optional extra.

Item	Description	Price	KShs.

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 6

EARTHING

Item	Description	Price	KShs.
1.	Supply and install, for each set, 4 No. steel cored copper earth rods, 1200 mm x 12 mm threaded for extension, connected by brass clamps to 30 metres of 25 mm x 3 mm copper earth tape laid in trenches of minimum depth 300 mm and fixed to the wall of the generator room with brass spacer bar saddles at 1 metre of intervals, connected to the station earth bar via a brass test clamp.		
Total carried forward to Price Summary			

Note: The earthing must be carried out strictly as above.

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 7

1. Details of Drawings, Literature, manuals etc. included with tender documents.
2. Time in **weeks** from acceptance of tender to delivery of equipment on site. _____ Weeks
3. Time in **weeks** from acceptance of tender to commissioning of set(s). _____ Weeks

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 8

WARRANTY

The warranty period for the set and all its auxiliaries, from the date of commissioning,
will be _____ months

(Note: A minimum of 12 months is required).

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 9 - FOREIGN CURRENCY

State Foreign currency used in the pricing and rate of exchange to the Kenya Shilling.

1 _____ (**Foreign Currency**) = _____ **Shillings.**

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 10 - ANNUAL MAINTENANCE

Cost of Annual Maintenance shall be Ksh. _____ per year.

Signed: (as in Tender) _____

Date: _____

APPENDIX NO. 11 – EXTERNAL FUEL TANK

- 3,000 litres (3.0 m³) external diesel fuel tank made from 10 gauge galvanized pressed steel, external (welded) 50mm square steel-bar diagonal and vertical supports.
0.5m high x 2.5m long x 1.4m wide steel stand in 8 gauge 100mm x 100mm (welded) hollow steel tubes and the following:-
 - Internal stays
 - 18 gauge galvanized steel cover lid
 - Manual hand-operated fuel transfer pump with hose connection
 - Connection for 15mm diameter class B gms pipe with “CRANE” gate valve and union.
 - 6m long 15mm diameter class B gms pipe
 - 4 No. Galvanized malleable iron elbow
 - 20mm diameter drain pipe with “CRANE gate valve
 - Clear accurately-calibrated level indicating tubing connection on the outside.
 - All other accessories

KSh. _____

APPENDIX NO. 12 – HOT AIR DUCTING

Hot air-duct comprising:

1.	Galvanized mild steel sheet 3mm thickness(both inside /outside)-	120 m ²
2.	Square hollow section tubes 50mm x 50mm, 3mm thickness, 0.3m centres	- 80 m
3.	Heat resistant fibre glass	- 90 m ²
4.	Allow for welding the metal and applying prime coat of paint	- Item
5.	50mm x 50mm x 3mm weldmesh in front of ventilation duct	- 5 m ²

PART G:

BILLS OF QUANTITIES

PART G: BILLS OF QUANTITIES

CLAUSE NO.	DESCRIPTION	PAGE
1.	GENERAL NOTE TO TENDERERS	G/3
2.	STATEMENT OF COMPLIANCE	G/4
3.	BILL NO. 1, 500KVA STANDBY GENERATOR	G/5
4.	BILL NO. 2, ASSOCIATED ELECTRICAL WORKS	G/8
5.	BILL NO. 3, GENERAL ITEMS	G/10
6.	SUMMARY PAGE	G/12

BILLS OF QUANTITIES

1. General Note to Tenderers

- 1.1 The total of the prices in the summary of prices shall include for the whole of the Contract works in accordance with the specifications as defined before and shall be carried forward to Form of Tender.
- 1.2 Any prices omitted from any item, section or part of the price schedule shall be deemed to have included in another item, section or part.
- 1.3 The prices shall include for all obligations under the Contract including and not limited to:
 - a) Supply of any materials, equipment, apparatus, fittings, spares and tools
 - b) Insurance
 - c) Clearing and forwarding
 - d) Delivery, handling and storage at site
 - e) Packing for storage
 - f) Replacing any defective or damaged item
 - g) Installation
 - h) Testing
 - i) Painting
 - j) Commissioning
 - k) Maintenance during the defects liability period
- 1.4 The unit rates shall include import duty and VAT where applicable, and shall be expressed in Kenya Shillings.
- 1.5 Any tenderer whose firm uses the title “Engineer” or “Engineering” must provide evidence of registration of at least one of the directors by the Engineers Registration Board of Kenya to avoid disqualification.
- 1.6 Any tenderer who fails to price the General items will be deemed to have allowed 5% of his tender price to cover these items.

2. **Statement of Compliance**

- a) I confirm compliance of all clauses of the General Conditions, General Specifications, Particular Specifications, Technical 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:

**KENYA REINSURANCE CORPORATION LTD.
 SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
 GENERATOR SET AT REINSURANCE PLAZA, KISUMU
 BILLS OF QUANTITIES**

BILL NO. 1: STANDBY GENERATOR AND ASSOCIATED WORKS

ITEM No	ITEM DETAILS	AMOUNT
01	Supply of 1 No. 300 KVA* sound-Attenuated standby generating set, 415V/240V 3-phase, 1500 rpm, Max 60 dBA at 1 M. (*Site rating, to be achieved in Kisumu which is at 1125 asl. Supplier to state actual sea-level rating as per appendices 1 and 2).	KShs
02	Installation of the Generating set	KShs
03	Supply of daily service tank	KShs
04	Installation of daily service tank	KShs
05	Supply of control panel(s), (complete with ov/uv relays)	KShs
06	Installation of control panel(s)	KShs.....
07	Supply of Automatic changeover contactor unit(s)	KShs.....
08	Installation for Automatic changeover contactor unit(s)	KShs.....
09	400A TPN Manual by-pass system across the AMF panel to be complete with 4 No 800A TPN Manual change over switch for bypassing both the mains and the generator, a firmly bonded enclosure in 12 gauge galvanized steel, and finished in stove enameled appropriately coloured paint, mounting rails, and sufficient space for cable termination and mounting of switches	1No KShs.....
10	Comprehensive and detailed testing/Commissioning of set as per full procedures set out in the Technical Specifications	KShs.....
Total C/F to Page G/6		_____

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU
BILLS OF QUANTITIES**

BILL NO. 1: STANDBY GENERATOR AND ASSOCIATED WORKS

ITEM No.	ITEM DETAILS	AMOUNT
	Total B/F from Page G/5	_____
11	Supply of manual fuel transfer pump plus the necessary piping to interconnect the daily service tank and the fuel storage tank	KShs.....
12	Installation of the manual fuel transfer pump and all pipework	KShs.....
13.	Cost of tools as per Appendix No. 4	KShs.....
14.	Cost of spares as per Appendix No. 5	KShs.....
15.	Cost of earthing as per Appendix No. 6	KShs.....
16.	Industrial silencer for the generator	KShs.....
17.	Dia. 100mm, 3mm thick galvanized stainless steel tube exhaust system for generator complete with brackets and black industrial (gloss paint), 90 m	KShs.....
18.	Hot air ducting as per details shown in Appendix 12	KShs.....
19.	3,000 lts (3.0m ³) external fuel tank, as per details shown in Appendix No. 11	KShs.....
	Total C/F to Page G/7	_____ _____

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU
BILLS OF QUANTITIES**

BILL NO. 1: STANDBY GENERATOR AND ASSOCIATED WORKS

ITEM No.	ITEM DETAILS	AMOUNT
	Total B/F from Page G/6	<hr/>
20.	Allow for performing 100% full load testing with 100% resistive load. Contractor to allow for all the necessary cabling and communications.	KShs.....
21.	Introduce external anti-vibration dumpers to supplement the factory-made ones	KShs.....
22.	Any other items (to be detailed)	KShs.....
23a).	4C 185mm ² PVC/SWA/PVC copper cable 80 m	KShs.....
23b).	Cable glands for the above cable, 4 No.	KShs.....
23c).	Cable lugs for the above cable, Complete with hydraulic crimping, 16 No.	KShs.....
24a).	4C 4mm ² PVC/SWA/PVC copper control cable, 30 m	KShs.....
24b).	Cable glands for the above cable, 2 No.	KShs.....
24c).	Cable lugs for the above cable, 8 No.	KShs.....
25	300mmx50mm metal cable tray complete with supports,cable ties and all accessories ,manufactured in 14 gauge galvanised steel, 60m	KShs.....
26	4.5 Kg carbon dioxide gas fire extinguisher complete with Pressure Gauge, initial charge and mounting brackets. ,2 No	KShs.....
27	9 kg dry powder fire extinguisher complete with initial charge and mounting brackets 2 No	KShs.....
28	The following mandatory tests to be performed on the generator set to the full satisfaction of the Client and all the parties to the contract:- i. Off-load tests ii. Full-load tests with resistive loads, up to 110% loading iii. Demonstration of the performance and function of the Change over Unit including alternative simulation of plant failure, iv. Provision of all the required instrument, tools and fuel required to undertake a 24-hour full-load performance testing of the set while on load	KShs.....
	Total C/F to Summary Page)	<hr/>

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU
BILLS OF QUANTITIES**

BILL NO. 2: ASSOCIATED ELECTRICAL WORKS FOR THE GENERATOR INSTALLATION

Item No.	Description	Qty	Unit	Rates	Amount
	Supply, install, test, commission and set to work the following:-				
2.00	New 400A TPN MCCB in metallic enclosure, as shown. The MCCB to be adjustable in 320-400A range	1	No.		
2.01	Label the above MCCB in 10mm high permanent traffolyte labels thus: "MAIN SWITCH, GENERATOR SUPPLY"		Item		
2.02	Load Transfer Switch Panel manufactured in 14 gauge galvanized steel with enough space for the following: - <ul style="list-style-type: none"> a) 1 No. 400 A TPN MCCB main incomer type NS 400N with adjustable over current settings and having a short-circuit breaking capacity of 50KA at 415Vac, 50Hz. The MCCB to be adjustable in 320-400A range. b) 5 No. 500A TPN insulated copper bus bars of 80 x 10 mm cross section. c) 17 No. 63A SPN MCBs as shown, but adjustable in the range 40 –63A. d) 1 No. 80A 3 P TPN motorized MCCBs as shown, but adjustable in the range 63 –80A e) 1 No. 315A 3 P TPN motorized MCCBs as shown, but adjustable in the range 275 –315A f) 17 No 63A TP/N automatic load transfer switches as Telemecanique. The load transfer switches to comprise with 2 No. 63A TP/N contactors electrically and mechanically interlocked, and "generator"/"mains" indicator lamp. The mains contactor to have "voltage-free", normally closed N/C contacts. g) 1 No 80A TP/N automatic load transfer switches as Telemecanique. The load transfer switches to comprise with 2 No. 80A TP/N contactors electrically and mechanically interlocked, and "generator"/"mains" indicator lamp. The mains contactor to have "voltage-free", normally closed N/C contacts. 				
	Total C/F to Page G/9				

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU
BILLS OF QUANTITIES**

BILL NO. 2: ASSOCIATED ELECTRICAL WORKS FOR THE GENERATOR INSTALLATION

Item No.	Description	Qty	Unit	Rates	Amount
	Total B/F from PageG/8				
	h) 1 No 135A TP/N automatic load transfer switch as Telemecanique. The load transfer switches to comprise with 2 No. 135A TP/N contactors electrically and mechanically interlocked, and “generator”/”mains” indicator lamp. The mains contactor to have “voltage-free”, normally closed N/C contacts.				
	i) Sufficient spare capacity for future development				
	j) Sufficient Knock-outs for incoming/outgoing cable.				
	k) Comprehensive protective multiple earthing of item No. 1.01 in 1500mm long 12mm diameter pure electrolytic copper earth rod deep driven to permanent moisture level, copper clamp. 100mm ² green earth lead complete with all accessories. (Note: Use parallel rods if effective earthing cannot be achieved with 1 No. rod).				
	l) Bus bars Chamber				
	m) Main earth terminal		Item		
2.03	Label each of the above MCBs and MCCBs in item nos. 2.02 above thus: Generator supply – SHOP No. 1, Generator supply SHOP No. 2 etc.”		Item		
2.04	Install blanking plates in all un-used spare ways	1	No.		
2.05	4x16mm ² +1x10mm ² SC-PVC-CU cables between the main breakers for each shop and the load transfer switch panels.	400	m		
2.06	Allow for disconnection of the existing 2 No Standby Generator sets for tenants and handing over to the relevant parties		Item		
	Total for Bill No. 2 C/F to Summary Page				

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU
BILLS OF QUANTITIES**

BILL NO.3 – GENERAL ITEMS

Item No.	Description	Qty	Unit	Rate	Amount KSh.
3.00	Carry out comprehensive 24-hour power analysis, after installation of the Generator set and switch gear, with a digital power meter (with printer) to: i) Record and print all the power system parameters. ii) Submit 3 copies of the printouts. (Note: Parameters must be satisfactory before the generator set is switched on).		Item		
3.01	Acquire and submit a Bank Guarantee for 10% of the sub-contract sum, as a Performance Guarantee.		Item		
3.02	Acquire and submit Insurance for the sub-contract work.		Item		
3.03	Allow for presentation of all the required samples as per specifications, Bills of Quantities and Drawings.		Item		
3.04	Prepare and submit Working Drawings as follows:- i) Draft soft copy in Archicad® and Autocad® 2000 in CD-RW. ii) Amended soft copy in Archicad® and Autocad® 2000 in CD-RW. iii) 5 Final soft copies in Archicad® and Autocad® 2000 in CD-RW to Architect, Client, Quantity Surveyor, and Engineer (2 copies) iv) 3 Draft hard-copies of Working Drawings in Ao (Scales 1:50, 1:25) to Engineer, Architect and Main Contractor. v) 2 Amended hard copies of Working Drawings in Ao (Scales 1:50 and 1:25) to Engineer, Architect and Main Contractor. vi) 11 No. Final hard copies of working drawings in Ao (Scales 1:50, 1:25) to Engineer (3 copies), Architect (1 copy), Quantity Surveyor (1 copy), Client (3 copies), Contractor (3 copies). (Note: Full set of drawings to be presented as per drawing list).		Item		
3.05	As item no. 3.04, but for Record (As-Installed) Drawings comprising: i) Fully dimensioned drawings of all plants and apparatus.		Item		
Total C/F to Page G/11					

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU**

BILLS OF QUANTITIES

BILL NO.3 – GENERAL ITEMS

Item No.	Description	Qty	Unit	Rate	Amount KShs
	Total B/F from Page G/10				
	ii) General arrangement drawings of equipment, plant etc.				
	iii) Routes – types and sizes and arrangement of all pipe work.				
	iv) System schematics and trunking diagrams showing all salient information relating to control and instrumentation.				
	v) Grading charts				
	vi) Wiring and piping diagrams of plant and apparatus.				
	vii) Schematic diagram of individual plants and switch and control boards.				
	viii) All the required operating instructions for all panels, boards, control panels etc.		Item		
3.06	Prepare and submit Maintenance Manuals for all items installed.		Item		
3.07	Provide a year's (12 months') initial maintenance upon expiry of the Defects Liability Period. The maintenance to be carried out every quarter (3 months) for a period of 12 months.		Item		
3.08	<u>All other items</u> of general preliminary to cover, but not limited to:-				
	i) Attendance on all other sub-contractors, such as for Communication Services, Mechanical Installations, Security Installations, Sound Equipment/ Wiring Installations, Generator Installations, Lift Services, Solar Water Heating, V-Sat services etc.				
	ii) Hiring and keeping a Supervisor/Foreman on site				
	iii) Constant supervision of the works.				
	iv) Provision of all the required spares.				
	v) Testing and Inspection of materials/works.				
	vi) Provision of labour camps.				
	vii) Storage of materials.				
	viii) Initial maintenance (During Defects Liability)				
	ix) Providing water/electricity for the works.				
	x) Protection of the works/materials				
	xi) Clearing away on completion.				
	xii) Preparing Final Account.				
	xiii) Providing all Test Certificates, etc.		Item		
Total for Bill No. 3 C/F to Summary Page					

**KENYA REINSURANCE CORPORATION LTD.
SUPPLY AND INSTALLATION OF A NEW 300 KVA SOUND-ATTENUATED STANDBY
GENERATOR SET AT REINSURANCE PLAZA, KISUMU
BILLS OF QUANTITIES
SUMMARY PAGE**

Item No.	Description	KSh.	Cts.
1	Contract Preliminaries B/F from Part C		
2.	Bill No. 1 Standby Generator Installations B/F from Page G/7		
3.	Bill No. 2 Electrical Installations Associated with Generator Installations B/F from Page G/9		
4.	Bill No. 3 General Items B/F from Page G/11		
5.	Allow for Liaison with Kenya Power and Lighting Company Ltd during the reconnection of the new generator		
6.	Carry out very concise load balancing to achieve a maximum imbalance not greater than $\pm 10\%$ between any two phases, measured at the main switch.		
7.	Allow for carrying out comprehensive testing of the installation as per IEE Wiring Regulation, 17 th Edition		
8.	Sub-Total		
9.	Provisional sum for construction of generator cage and other associated builders work (Note: The sum to be expended against detailed costed builder's works drawing and to be done by other approved sub-contractors)		950,000.00
10.	Add 10% of the Sub-Total in Item No. 8 above as Contingency		
	Total Amount Carried to Form of Tender		

Total Amount in words _____

Our anticipated completion period from the date of receipt of Commencement Notice, to handing over the completed works, will be _____ weeks.

Tenderer's Name and Stamp _____

Signature _____

Date _____

PIN No. _____

VAT No. _____

Witness _____

Address _____

Signature _____

Date _____

PART H:
**TECHNICAL SCHEDULE OF ITEMS
TO BE SUPPLIED**

PART H: TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

CONTENTS

<u>CLAUSE NO.</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1.	GENERAL NOTES TO TENDERERS	H3
2.	TECHNICAL SCHEDULE	H4

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.

2. **TECHNICAL SCHEDULE**

ITEM	DESCRIPTION	MANUFACTURER	COUNTRY OF ORIGIN	REMARKS (Catalogue No.etc.)
1.00	300 KVA Standby Generator			
1.01	Change-over Contactor Units			
1.02	Fuel Tank			
1.03	Industrial Silencer			
1.04	Manhole Covers			
1.05	Cable Tray			
1.06	Cable draw box			
1.07	Cable glands			
1.08	Diesel Engine			
1.09	Radiator Fan			
1.10	Radiator			
1.11	Oil Filter			
1.12	Air Filter			
1.13	Fuel Filter			
1.14	Over-speed trip			
1.15	Starter			
1.16	Starter Battery			
1.17	Pressure Gauge			
1.18	Tachometer			
1.19	Thermometer			
1.20	Voltmeter			
1.21	Frequency Meter			
1.22	Ammeter			
1.23	KWH meter			
1.24	Automatic Voltage Regulator			
1.25	Tool Box			

PART I:
STANDARD FORMS

CONTENTS OF SECTION J

TITLE	PAGE
1. Performance Bank Guarantee	I3
2. Tender Questionnaire	I4
3. Confidential Business Questionnaire	I5
4. Key Personnel	I7
5. Schedule of Contracts completed in the last five (5) years	I8
6. Schedule of on-going projects	I9
7. Evidence of Financial Resources to Meet Qualification Requirements	I10
8. Bidders Bank Information	I11
13. Schedule of Major Items of Contractor's equipment proposed for carrying out the works	I12
14. Site Visit Form	I13

NOTE:

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

PERFORMANCE BANK GUARANTEE

**To The Managing Director
 Kenya Reinsurance Corporation Ltd.
 P.O. Box 30271-00100
 NAIROBI**

Dear Sir,

WHEREAS(hereinafter called “the Contractor”) has undertaken, in
pursuance of Contract No. dated to execute
..... (hereinafter called “the Works”);

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you
with a Bank Guarantee by a recognised bank for the sum specified therein as security for compliance with
his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the
Contractor, up to a total of:

Kshs. (*amount of Guarantee in figures*)

Kenya Shillings

.....(*amount of Guarantee in words*),

and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or
sums within the limits of Kenya Shillings

..... (*amount of Guarantee in words*) as aforesaid
without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us
with the demand.

We further agree that no change, addition or other modification of the terms of the Contract or of the Works
to be performed thereunder or of any of the Contract documents which may be made between you and the
Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice
of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of Completion.

SIGNATURE AND SEAL OF THE GUARANTOR

Name of Bank

Address

Date

TENDER QUESTIONNAIRE

Please fill in block letters.

1. Full names of Tenderer:

.....

2. Full address of Tenderer 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

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.....

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:

	<i>Name in full</i>	<i>Nationality</i>	<i>Citizenship Details</i>	<i>Shares</i>
1.
2.
3.

4.

Part 2(c) – Registered Company

Private or Public

State the nominal and issued capita of the company:

Nominal KShs.

Issued KShs.

Give details of all directors as follows:

	<i>Name in full</i>	<i>Nationality</i>	<i>Citizenship Details*</i>	<i>Shares</i>
1.
2.
3.
4.

Part 2(d) Interest in the Firm:

Is there any person/persons in the employment of the Government of Kenya who has interest in this firm?
Yes/No (Delete as necessary)

I certify that the above information is correct.

.....
Title Signature Date

* Attach proof of citizenship

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, 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

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. _____

BIDDERS BANK INFORMATION

(This should be for banks that may provide reference if contacted by the employer)

NAME OF BANK	BANK BRANCH	ACCOUNT NAME	ADDRESS	TELEPHONE

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?)

SITE VISIT FORM

TO WHOMIT MAY CONCERN

**RE. SITE VISIT FOR THE PROPOSED SUPPLY AND INSTALLATION OF A NEW 300 KVA
SOUND-PROOFED STANDBY GENERATOR SET AND THE ASSOCIATED
ANCILLARY WORKS AT REINSURANCE PLAZA, KISUMU**

This is to confirm that

Mr./Mrs./Miss.....

Of M/s.....has visited

Reinsurance Plaza, Kisumu for the purpose of getting details on tender for the Proposed supply and installation of a new 300KVA Sound-Proofed Standby Generator set and the associated ancillary works.

Signature of Tenderer

Representative

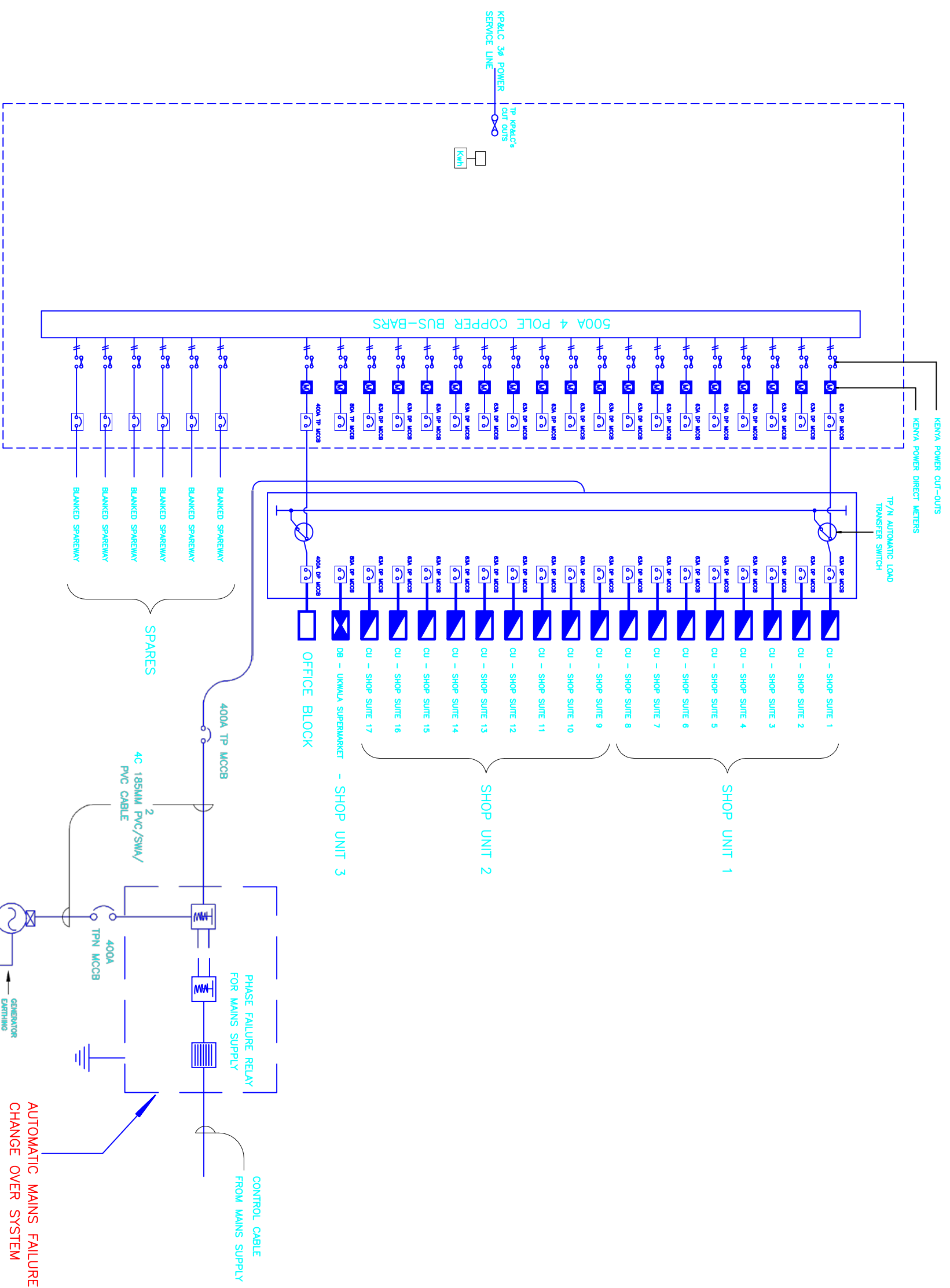
For Kenya Reinsurance Corporation Ltd.

Name:.....

Signature:.....

Date:.....

PART J
SCHEDULE OF DRAWINGS



FREE-STANDING 500A TPN MAIN SWITCHBOARD
WITH PERSPEX METER VIEWING WINDOWS

- NO. NOTES**
- DO NOT SCALE FROM THIS DRAWING USE FIGURED DIMENSIONS ONLY.
 - UNLESS STATED OTHERWISE, ALL DIMENSIONS TO BE IN MM.
 - THIS DRAWING IS TO BE READ ALONG WITH OTHER DRAWINGS AS PER DRAWING LIST.
 - STRUCTURAL ENGINEER'S APPROVAL TO BE GRANTED BEFORE CUTTING ANY FLOORS AND/OR WALLS.

REVISIONS

REV	DATE	DESCRIPTIONS	BY

Client
KENYA REINSURANCE CORPORATION LTD (KENYA RB)

Project
PROPOSED SEPARATION OF POWER METERS & INSTALLATION OF POWER FACTOR CORRECTION CAPACITOR BANK

Dwg. Title
SCHEMATIC LAYOUT

Consultants:

FERADON ASSOCIATES
 CONSULTING ENGINEERS
 P.O BOX 7375
 TEL: 2727594/2716143
 FAX: 2727555
 NAROBII,
 Email: consult@feradon.com

Scale	N.T.S	Approved	Eng. N.C
Date	MAY, 2012	Revision	
Des.	S.O	Dwn.	JNM
Job No.	1101-10	Dwg. No.	E1101-10-01