



**KARATINA UNIVERSITY**

**PROPOSED LIBRARY**

**GENERATOR INSTALLATION WORKS SUB-  
CONTRACT**

**BILL OF QUANTITIES**

**TENDER NUMBER: KarU/OT/004/2020-2021**

**Project Consultants:**

**JKUATES LTD**

**P.O. BOX 62000-00200**

**NAIROBI**

**OCTOBER 2020**

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# KARATINA UNIVERSITY

Inspiring Innovation and Leadership

Kagochi, Karatina, Nyeri

P.O BOX 1957-10101 Karatina

Email: [info@karu.ac.ke](mailto:info@karu.ac.ke), Website: [www.karu.ac.ke](http://www.karu.ac.ke)

## INVITATION TO TENDER

### OPEN TENDERS AND SUPPLIERS REGISTRATION

Karatina University invites tenders from interested eligible bidders for the under listed works and registration of suppliers.

ITEM	TENDER NUMBER	DESCRIPTION	ELIGIBILITY	CLOSING/ OPENING DATE	CLOSING/ OPENING DATE AND TIME
<b>OPEN TENDERS</b>					
1.	KarU/OT/004/2020-2021	Supply, delivery, installation, testing and commissioning of stand by generator	Open	10 <sup>th</sup> November,2020	12.00 Noon
2.	KarU/OT/005/2020-2021	Structured Cabling, IP-PABX, CCTV and Access control installation works	Open	10 <sup>th</sup> November,2020	2.30 PM
3.	KarU/OT/006/2020-2021	Air Condition and Mechanical ventilation works	Open	11 <sup>th</sup> November,2020	12.00 Noon
<b>REGISTRATION OF SUPPLIERS FOR 2020-2022 FINANCIAL YEARS</b>					
4.	Various categories for good, works and services	Registration of suppliers for financial years 2020-2022	Refer to the invitation to tenderers in the bid document	12 <sup>th</sup> November,2020	12.00 Noon

Interested and eligible contractors/suppliers may view and download tender documents free of charge from the University's website: [www.karu.ac.ke](http://www.karu.ac.ke) or the PPIP tender portal: [www.tenders.go.ke](http://www.tenders.go.ke) Enquiries may be sent via email to [procurement@karu.ac.ke](mailto:procurement@karu.ac.ke)

Completed tender documents should be deposited in the Tender Box placed at the Administration Block at Karatina University (Main Campus) on or before the closing date and time as indicated above. Late submission will not be accepted.

The tenders MUST be submitted in two (2) copies, one marked 'ORIGINAL'

**NOTES, STANDARD FORMS AND PRELIMINARIES**

**SPECIAL NOTES**

1. Tenders shall be submitted on the form of tender attached hereto and all blanks in this form and in the schedules attached to the specification shall be completed.
2. No alteration shall be made on the form of tender or in the specifications and schedules.
3. The tenderer (whether his tender is accepted or not) and all other recipients of the specification and documents shall treat the details of specification and the documents attached thereto as private and confidential.
4. The employer does not bind himself to accept the lowest or any tender and will not be responsible for or pay for expenses or losses which may be incurred by any tendered in the preparation of this tender.
5. It will be assumed that the tenderer will have visited the site, and to have taken into consideration any special difficulties and requirements not referred to herein but associated with the conditions of existing facilities, ground levels etc, as the case maybe, and to have made allowance for such in this tender
6. All items of additional information, issued to tenderers prior to the time for closing the bids, shall become a part of the Contract Documents and shall be included in the proposals.
7. The tenderer shall, where applicable, provide leaflets and catalogues giving technical and physical details of the fittings being offered by him as an integral part of his bid.
8. Unless otherwise specified in the particular specification, Tenderers shall assume that all fittings required will be import duty paid.
9. The Contractor is required to check the numbers of the pages of these Bills of Quantities against the contents stated on page (i) and should he find any missing, in duplicate or indistinct, he must inform the procuring entity at once and have the same rectified.
10. Should the Contractor be in doubt about the precise meaning of any item or figure, for any reason whatsoever, he shall inform the procuring entity in order that the correct meaning may be established before the date for submission of tenders.
11. No liability will be admitted or claim allowed in respect of errors in the Contractor's tender due to mistakes in the Bills of Quantities which should have been rectified in the manner described above.
12. The accurate ordering of materials is the sole responsibility of the contractor in accordance with the final drawings and the instructions from the Project Manager. No claim for any loss or expense will be entertained for orders for materials based upon Bills of Quantities.
13. The successful tenderer shall be required to enter in a sub- contract agreement with the main contractor under the terms of the KABCEC conditions of subcontract.
14. The copyright of these Bills of Quantities is vested in the Project Manager and no reproduction in part or in whole may be carried out without their express or written consent.

**FORM OF TENDER**

TO: \_\_\_\_\_ [Name of Employer) \_\_\_\_\_ [Date]  
\_\_\_\_\_ [Name of Contract]

Dear Sir,

1. In accordance with the Conditions of Contract, 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]
2. We undertake, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Project Manager’s notice to commence, and to complete the whole of the Works comprised in the Contract within *the main contract program*.
3. We agree to abide by this tender until \_\_\_\_\_ [Insert date; **90 days** from date of tender opening], and it 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.
5. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_

Signature \_\_\_\_\_ in the capacity of \_\_\_\_\_

Duly authorized to sign tenders for and on behalf of \_\_\_\_\_

\_\_\_\_\_ [Name of Contractor]

of \_\_\_\_\_ [Address of Contractor]

Witness; Name \_\_\_\_\_

Address \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

**FORM OF TENDER SECURITY**

WHEREAS \_\_\_\_\_ (hereinafter called “the Tenderer”) has submitted his tender dated \_\_\_\_\_ for the construction of \_\_\_\_\_ (name of Contract)

KNOW ALL PEOPLE by these presents that WE \_\_\_\_\_ having our registered office at \_\_\_\_\_ (hereinafter called “the Bank”), are bound unto \_\_\_\_\_ (hereinafter called “the Employer”) in the sum of Kenya shillings \_\_\_\_\_ (Kshs. \_\_\_\_\_) for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents sealed with the Common Seal of the said Bank this \_\_\_\_\_ Day of \_\_\_\_\_ 20 \_\_\_\_\_

THE CONDITIONS of this obligation are:

1. If after tender opening the tenderer withdraws his tender during the period of tender validity specified in the instructions to tenderers  
  
Or
2. If the tenderer, having been notified of the acceptance of his tender by the Employer during the period of tender validity:
  - (a) fails or refuses to execute the form of Agreement in accordance with the Instructions to Tenderers, if required; or
  - (b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Tenderers;

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including \_\_\_\_\_ [**thirty (30) days**] after the period of tender validity, and any demand in respect thereof should reach the Bank not later than the said date.

\_\_\_\_\_  
[Date]

\_\_\_\_\_  
[Signature of the Bank]

\_\_\_\_\_  
[Witness]

\_\_\_\_\_  
[Seal]

**FORM OF PERFORMANCE BOND**

To: \_\_\_\_\_(Name of Employer)\_\_\_\_\_ (Date)  
\_\_\_\_\_ (Address of Employer)

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 \_\_\_\_\_

**QUALIFICATION INFORMATION**

**1. Individual Tenderers or Individual Members of Joint Ventures**

1.1 Constitution or legal status of tenderer (attach copy or Incorporation Certificate);

Place of registration: \_\_\_\_\_

Principal place of business \_\_\_\_\_

Power of attorney of signatory of tender \_\_\_\_\_

1.2 Total annual volume of construction work performed in the last five years

Year	Volume	
	Currency	Value

1.3 Work performed as Main Contractor on works of a similar nature and volume over the last five years. Also list details of work under way or committed, including expected completion date.

Project name	Name of client and contact person	Type of work performed and year of completion	Value of contract (Kshs)



1.4 Major items of Contractor’s Equipment proposed for carrying out the Works. List all information requested below.

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?)

1.5 Qualifications and experience of key personnel proposed for administration and execution of the Contract. Attach biographical data.

Position	Name	Years of experience (general)	Years of experience in proposed position

1.6 Financial reports for the last five years: balance sheets, profit and loss statements, auditor’s reports, etc. List below and attach copies.

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1.7 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of supportive documents.

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- 1.8 Name, address and telephone, telex and facsimile numbers of banks that may provide reference if contacted by the Employer.

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- 1.9 Statement of compliance with the requirements of Clause 1.2 of the Instructions to Tenderers.

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- 1.10 Litigation and arbitration history (attach affidavit)

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- 1.11 Proposed program (work method and schedule) for the whole of the Works.

## 2 Joint Ventures

- 2.4 The information listed in 1.1 – 1.10 above shall be provided for each partner of the joint venture.
- 2.5 The information required in 1.11 above shall be provided for the joint venture.
- 2.6 Attach the power of attorney of the signatory(ies) of the tender authorizing signature of the tender on behalf of the joint venture
- 2.7 Attach the Agreement among all partners of the joint venture ( and which is legally binding on all partners), which shows that:
- a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
  - b) one of the partners will be nominated as being in charge, authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture; and
  - c) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

**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)

\_\_\_\_\_

Physical address \_\_\_\_\_

3. Telephone number (s) of tenderer

\_\_\_\_\_

4. Fax number(s) of tenderer

\_\_\_\_\_

5. E-mail address of tenderer

\_\_\_\_\_

6. Name of tenderer's representative to be contacted on matters of the tender during the tender period

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_  
Signature of Tenderer

Make copy and deliver to: \_\_\_\_\_ (*Name of Employer*)

**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 2 (d) 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: Kshs.....

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.....
.....			

***Part 2(c) – Registered Company:***

Private or public.....

State the nominal and issued capital of the Company-

PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

Nominal Kshs.....

Issued Kshs.....

Give details of all directors as follows:

Name in full . Nationality. Citizenship Details\*. Shares.

1.....

2.....

3.....

4.....

**Part 2(d) – Interest in the Firm:**

Is there any person / persons in .....(Name of Employer) who has interest in this firm? Yes/No.....(Delete as necessary)

I certify that the information given above is correct.

.....  
(Title) (Signature) (Date)

- Attach proof of citizenship

**ANTI-CORRUPTION DECLARATION FORM**

Date .....

To (name and address of employer)

.....

.....

I/We, the applicant(s) i.e. (name and address) .....

.....

declare that I/we:

- a) Has/have not been debarred from participating in public procurement.
- b) Has/have not been involved in and will not be involved in corrupt and fraudulent practices regarding public procurement.

.....

Title

Signature

Date

(To be signed by authorized representative of contractor and officially stamped)

## **INSTRUCTIONS TO TENDERERS AND EVALUATION CRITERIA**

### **1. General**

- 1.1 The Employer as defined in the Appendix to Conditions of Contract invites tenders for Works Contract as described in the tender documents. The successful tenderer will be expected to complete the Works by the Intended Completion Date specified in the tender documents.
- 1.2 All tenderers shall provide the Qualification Information, a statement that the tenderer (including all members of a joint venture and subcontractors) is not associated, or has not been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the Works, and any of its affiliates, shall not be eligible to tender.
- 1.3 In the event that pre-qualification of potential tenderers has been undertaken, only tenders from pre-qualified tenderers will be considered for award of Contract. These qualified tenderers should submit with their tenders any information updating their original pre-qualification applications or, alternatively, confirm in their tenders that the originally submitted pre-qualification information remains essentially correct as of the date of tender submission.
- 1.4 Where no pre-qualification of potential tenderers has been done, all tenderers shall include the following information and documents with their tenders, unless otherwise stated:
  - (a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the tender to commit the tenderer,
  - (b) total monetary value of construction work performed for each of the last five years,
  - (c) experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed; and names and addresses of clients who may be contacted for further information on these contracts,
  - (d) major items of construction equipment proposed to carry out the Contract and an undertaking that they will be available for the Contract,
  - (e) qualifications and experience of key site management and technical personnel proposed for the Contract and an undertaking that they shall be available for the Contract.
  - (f) reports on the financial standing of the tenderer, such as profit and loss statements and auditor's reports for the past five years;
  - (g) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
  - (h) authority to seek references from the tenderer's bankers;

- (i) information regarding any litigation, current or during the last five years, in which the tenderer is involved, the parties concerned and disputed amount; and
  - (j) proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price.
- 1.5 Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated:
- (a) the tender shall include all the information listed in clause 1.4 above for each joint venture partner;
  - (b) the tender shall be signed so as to be legally binding on all partners;
  - (c) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
  - (d) one of the partners will be nominated as being in charge, authorised to incur liabilities, and receive instructions for and on behalf of all partners of the joint venture; and
  - (e) The execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.
- 1.6 To qualify for award of the Contract, tenderers shall meet the following minimum qualifying criteria;
- (a) annual volume of construction work of at least 2.5 times the estimated annual cashflow for the Contract;
  - (b) experience as main contractor in the construction of at least two works of a nature and complexity equivalent to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete);
  - (c) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed as required for the Works;
  - (d) a Contract manager with at least five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and
  - (e) Liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than 4 months of the estimated payment flow under this Contract.
  - (f) The figures for each of the partners of a joint venture shall be added together to determine the tenderer's compliance with the minimum qualifying criteria of clause 1.6 (a) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 1.6 (a), (b) and (e) for an individual tenderer, and the partner in charge at least 40 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the joint venture's tender. Subcontractors' experience and resources will not be taken into account in determining the tenderer's compliance with the qualifying criteria, unless otherwise stated.



- 1.7 Each tenderer shall submit only one tender, either individually or as a partner in a joint venture. A tenderer who submits or participates in more than one tender (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the tenderer's participation to be disqualified.
- 1.8 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.
- 1.9 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Works and its surroundings, and obtain all information that may be necessary for preparing the tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the tenderer's own expense.

## **2. Tender Documents**

- 2.1 The complete set of tender documents comprises the documents listed below and any addenda issued in accordance with Clause 2.4.
  - (a) These Instructions to Tenderers
  - (b) Form of Tender and Qualification Information
  - (c) Specifications
  - (d) Drawings
  - (e) Bills of Quantities
  - (f) Forms of Securities
- 2.2 The tenderer shall examine all Instructions, Forms to be filled and Specifications in the tender documents. Failure to furnish all information required by the tender documents, or submission of a tender not substantially responsive to the tendering documents in every respect will be at the tenderer's risk and may result in rejection of his tender.
- 2.3 A prospective tenderer requiring any clarification of the tendering documents may notify the Employer in writing or by cable, telex or facsimile at the address indicated in the letter of invitation to tender. The Employer will only respond to requests for clarification received earlier than seven days prior to the deadline for submission of tenders. Copies of the Employer's response will be forwarded to all persons issued with tendering documents, including a description of the inquiry, but without identifying its source.
- 2.4 Before the deadline for submission of tenders, the Employer may modify the tendering documents by issuing addenda. Any addendum thus issued shall be part of the tendering documents and shall be communicated in writing or by cable, telex or facsimile to all tenderers. Prospective tenderers shall acknowledge receipt of each addendum in writing to the Employer.
- 2.5 To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend, as necessary, the deadline for submission of tenders, in accordance with Clause 4.2 here below.

## **3. Preparation of Tenders**

- 3.1 All documents relating to the tender and any correspondence shall be in English language.
- 3.2 The tender submitted by the tenderer shall comprise the following:

- (a) These Instructions to Tenderers, Form of Tender, Conditions of Contract, Appendix to Conditions of Contract and Specifications;
  - (b) Tender Security;
  - (c) Priced Bill of Quantities;
  - (d) Qualification Information Form and Documents;
  - (e) Alternative offers where invited; and
  - (f) Any other materials required to be completed and submitted by the tenderers.
- 3.3 The tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for which no rate or price is entered by the tenderer will not be paid for when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause relevant to the Contract, as of 30 days prior to the deadline for submission of tenders, shall be included in the tender price submitted by the tenderer.
- 3.4** The rates and prices quoted by the tenderer shall only be subject to adjustment during the performance of the Contract if provided for in the Appendix to Conditions of Contract and provisions made in the Conditions of Contract. **NB: THE PRICES SHALL NOT BE ADJUSTED. THE CONTRACT SHALL BE FIXED PRICE.**
- 3.5 The unit rates and prices shall be in Kenya Shillings.
- 3.6 Tenders shall remain valid for a period of 90 days from the date of submission. However, in exceptional circumstances, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting the Tender Security. A tenderer agreeing to the request will not be required or permitted to otherwise modify the tender, but will be required to extend the validity of Tender Security for the period of the extension, and in compliance with Clause 3.7 - 3.11 in all respects.
- 3.7 The tenderer shall furnish, as part of the tender, a Tender Security for the amount specified in the invitation to tender. This shall be in the form of a bank draft or a bank guarantee from an established and reputable bank approved by the Employer.
- 3.8 The format of the Tender Security should be in accordance with the form of Tender Security included herein or any other form acceptable to the Employer. Tender Security shall be valid for 30 days beyond the validity of the tender.
- 3.9 Any tender not accompanied by an acceptable Tender Security shall be rejected. The Tender Security of a joint venture must define as "Tenderer" all joint venture partners and list them in the following manner: a joint venture consisting of" .....", ".....", and ".....".
- 3.10 The Tender Securities of unsuccessful tenderers will be returned within 28 days of the end of the tender validity period specified in Clause 3.6.

- 3.11 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the Contract Agreement and furnished the required Performance Security.
- 3.12 The Tender Security may be forfeited
- (a) if the tenderer withdraws the tender after tender opening during the period of tender validity;
  - (b) if the tenderer does not accept the correction of the tender price, pursuant to Clause 5.7;
  - (c) in the case of a successful tenderer, if the tenderer fails within the specified time limit to
    - (g) sign the Agreement, or
    - (ii) furnish the required Performance Security.
- 3.13 Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. Alternatives will not be considered, unless specifically allowed in the invitation to tender. If so allowed, tenderers wishing to offer technical alternatives to the requirements of the tendering documents must also submit a tender that complies with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. In addition to submitting the basic tender, the tenderer shall provide all information necessary for a complete evaluation of the alternative, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details. Only the technical alternatives, if any, of the lowest evaluated tender conforming to the basic technical requirements shall be considered.
- 3.14 The tenderer shall prepare one original of the documents comprising the tender documents as described in Clause 3.2 of these Instructions to Tenderers, bound with the volume containing the Form of Tender, and clearly marked “ORIGINAL”. In addition, the tenderer shall submit copies of the tender, in the number specified in the invitation to tender, and clearly marked as “COPIES”. In the event of discrepancy between them, the original shall prevail.
- 3.15 The original and all copies of the tender 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, pursuant to Clause 1.5 (a) or 1.6 (b), as the case may be. All pages of the tender where alterations or additions have been made shall be initialed by the person or persons signing the tender.

#### **4. Submission of Tenders**

- 4.1 The tenderer shall seal the original and all copies of the tender in two inner envelopes and one outer envelope, duly marking the inner envelopes as “ORIGINAL” and “COPIES” as appropriate. **NB: TENDERERS TO PROVIDED 1 ORIGINAL AND 1 COPY OF THE TENDER.** The inner and outer envelopes shall:
- (a) be addressed to the Employer at the address provided in the invitation to tender;

- (b) bear the name and identification number of the Contract as defined in the invitation to tender; and
  - (c) provide a warning not to open before the specified time and date for tender opening.
- 4.2 Tenders shall be delivered to the Employer at the address specified above not later than the time and date specified in the invitation to tender. However, the Employer may extend the deadline for submission of tenders by issuing an amendment in accordance with Sub-Clause 2.5 in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline will then be subject to the new deadline.
- 4.3 Any tender received after the deadline prescribed in clause 4.2 will be returned to the tenderer un-opened.
- 4.4 Tenderers may modify or withdraw their tenders by giving notice in writing before the deadline prescribed in clause 4.2. Each tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with clause 3.13 and 4.1, with the outer and inner envelopes additionally marked "**MODIFICATION**" and "**WITHDRAWAL**", as appropriate. No tender may be modified after the deadline for submission of tenders.
- 4.5 Withdrawal of a tender between the deadline for submission of tenders and the expiration of the period of tender validity specified in the invitation to tender or as extended pursuant to Clause 3.6 may result in the forfeiture of the Tender Security pursuant to Clause 3.11.
- 4.6 Tenderers may only offer discounts to, or otherwise modify the prices of their tenders by submitting tender modifications in accordance with Clause 4.4 or be included in the original tender submission.

## **5. Tender Opening and Evaluation**

- 5.1 The tenders will be opened by the Employer, including modifications made pursuant to Clause 4.4, in the presence of the tenderers' representatives who choose to attend at the time and in the place specified in the invitation to tender. Envelopes marked "**WITHDRAWAL**" shall be opened and read out first. Tenderers' and Employer's representatives who are present during the opening shall sign a register evidencing their attendance.
- 5.2 The tenderers' names, the tender prices, the total amount of each tender and of any alternative tender (if alternatives have been requested or permitted), any discounts, tender modifications and withdrawals, the presence or absence of Tender Security, and such other details as may be considered appropriate, will be announced by the Employer at the opening. Minutes of the tender opening, including the information disclosed to those present will be prepared by the Employer.
- 5.3 Information relating to the examination, clarification, evaluation, and comparison of tenders and recommendations for the award of Contract shall not be disclosed to tenderers or any other persons not officially concerned with such process until the award to the successful tenderer has been announced. Any effort by a tenderer to influence the Employer's officials, processing of tenders or award decisions may result in the rejection of his tender.

- 5.4 To assist in the examination, evaluation, and comparison of tenders, the Employer at his discretion, may ask any tenderer for clarification of the tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex or facsimile 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 arithmetic errors discovered in the evaluation of the tenders in accordance with Clause 5.7.
- 5.5 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender (a) meets the eligibility criteria defined in Clause 1.7;(b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the tendering documents. A substantially responsive tender is one which conforms to all the terms, conditions and specifications of the tendering documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the works; (b) which limits in any substantial way, inconsistent with the tendering documents, the Employer's rights or the tenderer's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.
- 5.6 If a tender is not substantially responsive, it will be rejected, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 5.7 Tenders determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows:
- (a) where there is a discrepancy between the amount in figures and the amount in words, the amount in words will prevail; and
  - (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 the adjustment will be made to the entry containing that error.
  - (c) In the event of a discrepancy between the tender amount as stated in the Form of Tender and the corrected tender figure in the main summary of the Bill of Quantities, the amount as stated in the Form of Tender shall prevail.
  - (d) The Error Correction Factor shall be computed by expressing the difference between the tender amount and the corrected tender sum as a percentage of the corrected Builder's Work (i.e. Corrected tender sum less P.C. and Provisional Sums)
  - (e) The Error Correction Factor shall be applied to all Builder's Work (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.
  - (f) 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 3.11.

- 5.8 The Employer will evaluate and compare only the tenders determined to be substantially responsive in accordance with Clause 5.5.
- 5.9 In evaluating the 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 5.7;
  - (b) excluding provisional sums and the provision, if any, for contingencies in the Bill of Quantities, but including Dayworks where priced competitively.
  - (c) making an appropriate adjustment for any other acceptable variations, deviations, or alternative offers submitted in accordance with clause 3.12; and
  - (d) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with clause 4.6
- 5.10 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in unsolicited benefits for the Employer will not be taken into account in tender evaluation.
- 5.11 The tenderer shall not influence the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. Any effort by the Tenderer to influence the Employer or his employees in his decision on tender evaluation, tender comparison or Contract award may result in the rejection of the tender.
- 5.12 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.

## **6. Award of Contract**

- 6.1 Subject to Clause 6.2, the award of the Contract will be made to the tenderer whose tender has been determined to be substantially responsive to the tendering documents and who has offered the lowest evaluated tender price, provided that such tenderer has been determined to be (a) eligible in accordance with the provision of Clauses 1.2, and (b) qualified in accordance with the provisions of clause 1.7 and 1.8.
- 6.2 Notwithstanding clause 6.1 above, the Employer reserves the right to accept or reject any tender, and to cancel the tendering process and reject all tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the action.
- 6.3 The tenderer whose tender has been accepted will be notified of the award prior to expiration of the tender validity period in writing or by cable, telex or facsimile. This notification (hereinafter and in all Contract documents called the "Letter of Acceptance") will state the sum (hereinafter and in all Contract documents called the "Contract Price") that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract.

The notification of award will constitute the formation of the Contract, subject to the tenderer furnishing the Performance Security in accordance with Clause 6.6 and signing the Agreement in accordance with Clause 6.4.

- 6.4 The Agreement will incorporate all agreements between the main contractor and the successful tenderer. The agreement shall be acceptable to the employer.
- 6.5 Within 21 days after receipt of the Letter of Acceptance, the successful tenderer shall deliver to the main contractor a performance Security in the amount stipulated in the Appendix to Conditions of Contract and in the form stipulated in the Tender documents. The Performance Security shall be in the form of a Bank Guarantee, and shall be issued at the tenderer's option, by a reputable bank located in Kenya and acceptable to the Employer.
- 6.6 Failure of the successful tenderer to comply with the requirements of clause 6.5 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Tender Security.
- 6.7 Upon the furnishing by the successful tenderer of the Performance Security, the Employer will promptly notify the other tenderers that their tenders have been unsuccessful.

**APPENDIX TO INSTRUCTIONS TO TENDERERS**

The following instructions for tender evaluation shall supplement, complement or amend the instructions to tenderers.

Where there is a conflict between the provisions of instructions to tenderers and this appendix, the provisions of the appendix herein shall prevail.

**TENDER EVALUATION CRITERIA**

**A) Preliminary evaluation (Mandatory requirements)**

To be deemed as responsive, tenders shall be checked for the following mandatory requirements:

Item	Description	Remark (x/√)
1	Form of tender dully filled (Original)	
2	Bid security of Kshs One Hundred and Fifty Thousand (Kshs 150,000.00) (Original)	
3	Company certificate of registration or incorporation (Provide Copy)	
4	Current registration certificate and practicing license with National Construction Authority (NCA) as a contractor in Electrical Engineering Services (Generating Plants and Control Panels) - Category 4 and above. (Provide copies of Current NCA registration and practicing license)	
5	Valid Energy and Petroleum Regulatory Authority (EPRA-A2) license (Copy)	
6	VAT/PIN registration certificate (Copy)	
7	Valid tax compliance certificate (Copy)	
8	Filled anti-corruption declaration form (Original)	
9	All pages in the tender document to be serially numbered	
10	Dully filled Tender Questionnaire and Confidential Business Questionnaire (Originals)	
11	Power of attorney where the signatory is not a director (Copies)	
12	Current form CR12 (for companies) and identity documents for the directors/proprietor	
13	Manufacturer’s authorization form/letter for the Generator being offered by the bidder	
	CONCLUSIVE REMARK	

Tenders that do not meet any of the above requirements shall be disqualified and not considered for further evaluation.



**B) Technical evaluation**

The tenderers shall be required;

- a) *To fill the Standard Forms provided in the bid document for the purposes of providing the required information. The tenderers may also attach the required information if they so desire;*
- b) *To supply equipment/items which comply with the technical specifications set out in the bid document. In this regard, the bidder will be required to submit relevant technical brochure/catalogues with the tender document, highlighting the Catalogue Number of the proposed items. Such brochures/ catalogues should indicate comprehensive relevant data of the proposed equipment/items which should include but not limited to the following:*
  - (i) *Standards of manufacture;*
  - (ii) *Performance ratings/characteristics;*
  - (iii) *Material of manufacture;*
  - (iv) *Electrical power ratings; and*
  - (v) *Any other necessary requirements (specify).*

The bid will then be analyzed, using the information in the technical brochures, to determine compliance with General and Particular technical specifications for the works as indicated in the tender document. The tenderer shall also fill in the Technical Schedule as specified in the tender document for Equipment’s and Items indicating the Country of Origin, Model/Make/Manufacturer and catalogue numbers of the Items/Equipment’s they propose to supply.

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

<b><u>PARAMETER</u></b>	<b><u>MAXIMUM</u></b>
<b><u>POINTS</u></b>	
(i) Compliance with Technical Specifications -----	40
(ii) Qualifications of key personnel -----	12
(iii) Contracts Completed in the last Five (5) years -----	9
(iv) Schedule of on-going projects -----	4
(v) Schedule of contractors equipment -----	12
(vi) Audited Financial Reports for the last 3 years -----	6
(vii) Evidence of Financial Resources -----	9
(viii) Name, Address and Telephone of Bank reference -----	3
(ix) Litigation and Arbitration History -----	5
<b>TOTAL</b>	<b><u>100</u></b>

The minimum score for Technical Evaluation is 70 percent.

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

**TABLE 1: Assessment for Eligibility**

PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

Item	Description	Point Scored	Max. Point
1	<p><b>Compliance with Technical Specifications</b></p> <ul style="list-style-type: none"> <li>Compliant----- 40</li> <li>Non-compliant ----- 0</li> </ul> <p>(Refer to table 2: compliance with technical specifications)</p>		40
2	<p><b>Qualifications of Key Personnel (Attach evidence)</b></p> <p><b>Director of the firm</b></p> <ul style="list-style-type: none"> <li>Holder of degree or diploma in relevant Engineering field ---- 4</li> <li>Holder of certificate in relevant Engineering field ----- 2</li> <li>Holder of trade test certificate in relevant Engineering field --1</li> <li>No relevant certificate ----- 0</li> </ul> <p><b>At least 1No. degree/diploma of key personnel in relevant field</b></p> <ul style="list-style-type: none"> <li>With over 10 years relevant experience ----- 4</li> <li>With over 5 years relevant experience----- 2</li> <li>With under 5 years relevant experience ----- 1</li> </ul> <p><b>At least 1No certificate holder of key personnel in relevant field</b></p> <ul style="list-style-type: none"> <li>With over 10 years relevant experience----- 2</li> <li>With over 5 years relevant experience ----- 1</li> <li>With under 5 years relevant experience -----0.5</li> </ul> <p><b>At least 2No artisan (trade test certificate in relevant field)</b></p> <ul style="list-style-type: none"> <li>Artisan with over 10 years relevant experience ----- 2</li> <li>Artisan with under 10 years relevant experience ----- 1</li> <li>Non skilled worker with over 10 years relevant experience -- 0</li> </ul>		12
3	<p><b>Contracts completed in the last five (5) years (Max of 3 No. Projects)- <u>Provide Evidence</u></b></p> <ul style="list-style-type: none"> <li>Project of similar nature, complexity and magnitude (3 Points per project) ----- 9</li> <li>Project of similar nature but of lower value than the one in consideration (2 Points per project) ----- 6</li> <li>No completed project of similar nature -----0</li> </ul>		9

PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

Item	Description	Point Scored	Max. Point
4	<b>On-going projects – Provide Evidence</b> <ul style="list-style-type: none"> <li>• No Project of similar nature, complexity and magnitude - 4</li> <li>• Three and below Project of similar, nature complexity and magnitude -----3</li> <li>• Four and above project of similar, nature complexity and magnitude -----2</li> </ul>		<b>4</b>
5	<b>Schedule of contractor’s equipment and transport (proof or evidence of ownership/Lease)</b>		
	<b>a) Relevant Transport</b> <ul style="list-style-type: none"> <li>• Means of transport (Minimum 1 Vehicle) ----- 6</li> <li>• No means of transport ----- 0</li> </ul>	6	<b>12</b>
	<b>b) Relevant Equipment</b> <ul style="list-style-type: none"> <li>• Has relevant equipment (Minimum of tool box)----- 6</li> <li>• No relevant equipment ----- 0</li> </ul>	6	
	<b>Financial reports</b>		
6	<b>Audited financial report (last three (3) years (2017-2019)</b> <ul style="list-style-type: none"> <li>• Average Annual Turn-over equal to or greater than the tender sum ----- 6</li> <li>• Average Annual Turn-over above 50% but below 100% of the tender sum ----- 3</li> <li>• Average Annual Turn-over below 50% of the tender sum - ----- 1</li> </ul>		<b>6</b>
7	<b>Evidence of Financial Resources (cash in hand, lines of credit, over draft facility etc.)</b> <ul style="list-style-type: none"> <li>• Has financial resources equal to or greater than the tender sum -----9</li> <li>• Has financial resources above 50% but below 100% of the tender sum ----- 6</li> <li>• Has financial resources below 50% of the tender sum----3</li> <li>• Has not indicated sources of financial resources ----- 0</li> </ul>		<b>9</b>
8	<b>Name, Address and Telephone of Banks (Contractor to Provide)</b> <ul style="list-style-type: none"> <li>• Information Provided ----- 3</li> <li>• No Information Provided ----- 0</li> </ul>		<b>3</b>
9	<b>Litigation and Arbitration History</b> <ul style="list-style-type: none"> <li>• Provided ----- 5</li> <li>• Not filled ----- 0</li> </ul>		<b>5</b>
	<b>TOTAL</b>		<b>100</b>

**Only bidders who scores 70 points and above shall be considered for further evaluation**

**TABLE 2: Compliance with Technical Specifications**

*The bidder must comply with all technical specification to be awarded 40marks. Any bidder not complying with any of the specifications shall be awarded a zero marks.*

Item	Description	Minimum Requirements	Bidders Offer (Ratings/Size/Make/ Model/Cat. No./ Country of origin)	Compliance with Tender Specification (√ / ×)
	<b>Diesel Engine Generator</b>	<i>Canopied/sound attenuated</i>		
	<b>Generator net continuous rating</b>	<ul style="list-style-type: none"> <li>• <i>at site-350KVA (prime rated)</i></li> <li>• <i>Voltage-415V/3phase</i></li> <li>• <i>Frequency-50Hz</i></li> <li>• <i>Power Factor-0.8</i></li> </ul>		
	<b>Fuel Oil System</b>	<ul style="list-style-type: none"> <li>• <i>An auxiliary fuel storage tank minimum capacity sufficient to run the engine continuously on full load for 72 hours</i></li> <li>• <i>integral belly/base fuel tank for daily services with an operational running capacity of 8 hours.</i></li> </ul>		
	<b>Starting of Engine</b>	<ul style="list-style-type: none"> <li>• <i>facilities for local and remote push button starting,</i></li> <li>• <i>Local/ Remote/ Automatic selector switch at the local panel.</i></li> </ul>		
	<b>Lubricating Oil System</b>	<ul style="list-style-type: none"> <li>• <i>Lubricating oil Low Pressure Alarm,</i></li> <li>• <i>Lubricating Oil High Temperature Alarm,</i></li> <li>• <i>Cooling Water High Temperature Alarm.</i></li> </ul>		
	<b>Cooling System</b>	<i>air or water cooled</i>		
	<b>Engine Instruments</b>	<i>oil pressure gauge, running hours meter, water thermometer, oil thermometers</i>		
	<b>Excitation</b>	<i>brushless direct coupled exciter armature</i>		
	<b>Programmable logic controller (PLC) for synchronization</b>	<i>Integrated PLC for synchronization provided</i>		
	<b>Marks Awarded</b>			

**Stage 1**

Tenders shall be checked for arithmetic errors, inconsistencies and frontloading and subjected to the requirements of clause 5.7 of instructions to tenderers.

**Stage 2 and post qualification**

The lowest evaluated tender having passed stage 1 above shall be the winning bid subject to the employer's right to exercise due diligence relating to confirmation of information submitted by the bidder. Any bidder who shall be found to have supplied false or misleading information shall be disqualified and the next lowest tender that has passed stage 1 shall be considered.

## **PARTICULAR SPECIFICATIONS**

### **EMPLOYER**

The “Employer” is the **KARATINA UNIVERSITY** whose address unless otherwise notified is **P.O. BOX 1957-10101 KARATINA.**

### **PROJECT MANAGER**

The term "P.M." wherever used in the Bills of Quantities shall be deemed to imply the Project Manager as defined in the Conditions of Contract or such person or persons as may be duly authorized to represent him.

### **ARCHITECT**

The term “Architect” shall be deemed to mean “The P.M.” as defined above whose address unless otherwise notified is **JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY ENTERPRISES LTD (JKUATES), P.O. BOX 62000-00200 NAIROBI.**

### **QUANTITY SURVEYOR**

The term “Quantity Surveyor” shall be deemed to mean ‘The P.M.’ as defined above.

### **ELECTRICAL ENGINEER**

The term “Electrical Engineer” shall be deemed to mean “The P.M.” as defined above.

### **MECHANICAL ENGINEER**

The term “Mechanical Engineer” shall be deemed to mean “The P.M.” as defined above.

### **STRUCTURAL ENGINEER**

The term “Structural Engineer” shall be deemed to mean “The P.M.” as defined above.

## **THE CONTRACTOR OR MAIN CONTRACTOR**

The term ‘contractor’ or ‘main contractor’ shall be deemed to mean the firm appointed by the employer to carry out the main building works. The terms ‘contractor’ and ‘main contractor’ shall be synonymous.  
**WORKS**

The expression ‘work’ or ‘works’ shall mean all or any portion of the work, material and plant to be provided and the labour to be performed for the execution and in fulfillment of this contract, and whether the same may be on site or not.

### **THE SITE**

The proposed works shall be situated at KAGOCI, MATHIRA SUB-COUNTY, NYERI COUNTY.

The tenderer is advised to visit the site and will be deemed to have satisfied himself with regard to the existing conditions thereof, the means of access, the risk of injury or damage to existing property and property adjacent to the site or to the occupiers of such property. No claim by the contractor will be allowed on the ground of any misunderstanding or misapprehension in respect of any such matter or otherwise.

The contractor must obtain the approval of the Engineer regarding the use of any materials found on the site.

### **GENERAL DESCRIPTION OF THE WORKS**

The works comprise supply, installation and commissioning of a **350KVA Prime Rated Stand Diesel Generator**

### **SPECIFICATION**

Shall mean the whole of the contract document including but not restricted to:-

- a) This document comprising definitions and preliminaries, General specifications, particular specifications and schedules as contained herein.
- b) The contract drawings.

### **BILLS OF QUANTITIES**

Where the term 'Bills of Quantities' bears any relation to subcontract, it shall mean the 'specification' and the prices or any other schedules contained therein.

### **CONTRACT DRAWINGS**

Shall mean those drawings listed in the schedules or referred to herein, forming part of this specification.

### **MANUFACTURER'S RECOMMENDATIONS**

Shall mean the manufacturer's recommendation or instructions, printed or in writing and current at the time of execution of the works.

### **OR OTHER APPROVED**

Shall mean that commodities of a manufacturer other than that specified by the proprietary name may be substituted provided they meet the standards specified and that express approval has been obtained from the Engineer. The rates of prices will be held to be of the commodity specified and current at the time of tender.

### **PROPRIETARY NAME**

The phrase 'or other approved' shall be deemed to be included in every case where commodities are specified by proprietary name.

### **APPROVED, DIRECTED AND SELECTED**

Shall mean approved, directed or selected by the Engineer and shall not be binding unless put in writing and signed by the Engineer.

### **ABBREVIATIONS**

PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

- NO - shall mean number
- m - shall mean metre
- L.M - shall mean linear metre
- mm - shall mean millimetre
- kg - shall mean kilogramme
- Ltr. - shall mean litre
- S.S - shall mean stainless steel
- G.M.S - shall mean galvanised mild steel
- M.O.P.W- shall mean ministry of public works
- B.S - shall mean the Current British standards specification published by  
The British standard Institution
- C.P - shall mean the current British standard code of practice published  
together with the B.S
- I.E.E - shall mean the Institute of Electrical Engineers, Savoy Place  
, London.
- I.S.O - shall mean the International organization for standardization
- K.B.S - shall mean the Kenya Bureau of Standards.
- Ditto - shall mean the whole of the preceding description except as qualified  
in the description in which it occurs.



## **GENERAL SPECIFICATIONS OF MATERIALS AND WORKS**

This specification is to be read in conjunction with any other information herein issued with it. Bills of quantities and schedule of unit rates shall be the basis of all additions and omissions during the progress of the works.

### **STANDARD OF MATERIALS**

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

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

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

### **WORKMANSHIP**

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

Any work that does not in the opinion of the Engineer conform to the best standard practice will be removed and reinstated at the contractor's expense.

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

### **PROCUREMENT OF MATERIALS**

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

Contractors are warned that they must make their own arrangements for the supply of materials and/or products specified or required. Where necessary, advance payment shall be granted as stipulated in the Appendix to Instruction to Tenderers clause 9 page A/17

### **RECORD DRAWINGS**

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

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

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

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

## **REGULATIONS AND STANDARDS**

All work executed by the contractor shall comply with the current edition of the “Regulations” for the Electrical Equipment of Buildings, issued by the Institution of Electrical Engineers, Electric Power Act, Kenya Bureau of Standards (KBS), Institution of Electrical Engineers (I.E.E) Wiring Regulations, Current recommendation of CCITT and CCIR, and with the Regulations of the Local Electricity Authority and the Communications Authority of Kenya (CAK)

Where the sets of regulations appear to conflict, they shall be clarified with the Engineer.

## **SETTING OUT WORK**

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

## **TESTING ON SITE**

The contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specifications No. 1 and No.2, Electric Supply Company’s By-Laws, Communications Authority of Kenya (CAK) requirements or any other supplementary Regulations as may be produced by the engineer.

Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation shall be rectified by the contractor at his own expense.

## **GENERAL SPECIFICATION OF DIESEL ENGINE GENERATORS**

### **1. Extent of Contract Works**

The work covered by this specification includes the supply, delivery, installation, setting to work, commissioning to the satisfaction of the engineer and maintenance for a period of twelve months, of a Diesel Engine Generating set complete with all necessary ancillary equipment and as indicated.

### **2. Regulations and Standards**

The equipment shall comply with all relevant statutory instruments and regulations current at the date of tender and in particular the following:

1. I.E.E Wiring Regulations
2. Regulation under the Electric Power Act
3. Factories Act
4. Any special regulations issued by the local Electricity or Water Undertakings
5. Kenya Bureau of Standards (K.B.S)

The equipment and all components shall comply with all relevant KBS standards and codes of practice or other equal and approved standards 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 of practice, then the difference is to be stated in writing and must accompany the tender submission.

### **3. Conformity with the specification.**

The equipment to be supplied shall conform in all respects to the specifications. Unless another standard is specifically mentioned in the specification, all materials and practices employed in the works must, where such standards exist be in accordance with the current KBS standards or code of practices or in accordance with such other authorized standard appropriate to the country of manufacture as in the opinion of the Engineer ensures equivalent or higher quality.

Alternative which deviate in any respect from the specifications may only be submitted in addition to the main offer required by the Specification. Such alternative must be fully detailed and the price indicated may be considered for adoption after the comparison of quotation submitted in accordance with the Specifications.

### **4. Information required with Tenders**

Each tender shall be accompanied by 2 sets of technical manual showing general arrangement and typical details of the equipment offered.

All tender documents and any communications thereof shall be in English language.

### **5. Site Conditions**

The contractor is deemed to have visited the site and if unable to locate it to apply to the Engineer for directions to enable him to do so. The contractor is deemed to have acquainted himself therewith as to its nature, position, means of access, etc and no claim in the connection will be allowed. No claim will be allowed for traveling or other expenses which may be incurred by the contractor in visiting the site or preparing a tender for the contract works.

### **6 Tropicalisation of Components**

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

### **7 Surface finish**

All ferrous metal work shall be either painted or processed to give a rust proof coating. 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 four 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.

Successive coats of paint shall be 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.

### **8. Recording Drawings**

The Contractor shall provide to the engineer four sets of the following drawings:

- a) Where indicated a building drawing showing details of cable entries, pipe entries and ducts required, and the exhaust system.
- b) A general arrangement drawing showing the principal dimensions and weight of the set.
- c) A general arrangement of the diesel engine.

- d) A general arrangement of the alternator and exciter showing terminal markings, polarity and phase rotation
- e) A general arrangement of the electrical control panel(s).
- f) A schematic and wiring diagram of the electrical control panel (s)

### **9. Maintenance Manual**

Upon practical completion of the Contract works the Contractor shall furnish to the Engineer four copies of Manuals. The manuals shall be printed on good quality paper International A4 size and shall have stiff covers of durable materials.

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 specification hereinafter:

- a) System Description
- b) Plant
- c) Valve Operation
- d) Switch Operation
- e) Procedure of Fault Finding
- f) Emergency Procedures
- g) Lubrication Requirement
- h) Maintenance and Servicing periods and Procedures
- i) Colour coding legend for all services
- j) Schematic and wiring Diagrams of plant, Apparatus and Switchgear
- k) Record Drawings, true too scale, reduced to international A4 size
- l) Lists of primary and secondary spares

The Manual is to be specially prepared for the contract works and Manufacture'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 electrical Engineer.

The maker's name, the rating of the set, the contract number, the location of the site and the year of installation shall appear on the front covers.

### **10. Factory Tests**

The set shall be tested as a unit at the manufacturer's workshop (or elsewhere by agreement) for output and performance generally in accordance with the requirements of BS 649 and as 2613.

The Engineer shall be given adequate notice in writing of the date and time of the work tests and he, or his representative shall if he so desires, be present at such tests and given all reasonable facilities for his own inspections during the course of the tests.

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

### **11. Installation**

Installation of all plant and equipment shall be carried out by the contractor under adequate supervision from skilled staff provided by the plant and equipment manufacturer or his appointed agent.

Plant or equipment which are 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.

### **12. Spare parts**

The contractor shall submit with his tender a separate priced list of recommended spare parts including any optional extras which he recommends should be purchased for the set and its control equipment and are not

supplied as standard with the unit. The initial spares required at handover shall be deemed to have been included in the tender pricing.

### **13. 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 be of the best quality, the spanners being of chrome vanadium 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 Contractor in the execution of the contract works but will not be accepted as part of the Contract works by the Engineer unless they are handed over in clean and undamaged condition, in perfect working order and effectively in new condition.

### **14. Maintenance period**

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

During this maintenance period, the contractor shall at his own expense.

- a) Make good any defects in the unit and replace any parts that fail or show signs of weakness or undue wear in consequences of faulty design, workmanship or materials.
- b) Visit the site with all diligence and attend to any such defect that arises within 48 hours of receiving notification of the defect.
- c) Carry out regular examination and services 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 (where necessary) to keep the unit in sound and efficient working order.
- d) Instruct the maintenance personnel in the proper operation, care and maintenance of the set and its equipment.

If during the maintenance period the unit is or is likely to be out of use for a period greater than 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 Contractor, the 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 to proper working order.

At the end of the twelve months' period of maintenance the Contractor shall (in addition to normal servicing work) carry out a compressive examination and test of the set and its auxiliaries, to ensure that the unit is in proper working order and in satisfactory condition for handing over to the Engineer whose representative shall be present at such examination and test.

### **15. Maintenance Contract.**

The Contractor may be called upon to enter into maintenance contract with the Employer for the servicing the Generating sets after the expiry of the initial maintenance period. The Contractor shall indicate his willingness to carry out this service at the time of tendering and shall ensure that component personnel are available locally to be called at short notice to attend to Generator faults.

### **16. Transport and Storage**

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

PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

On arrival at site all plant and equipment shall be examined and any damage to parts and protective priming coats made good before storage or installation.

## **PARTICULAR SPECIFICATIONS FOR THE STANDBY GENERATING SYSTEM**

### **1 Location of site**

The site for the proposed Contract Works is at **Karatina University, Nyeri County**

### **2 Climatic Condition**

The following climatic conditions apply at the site of the Contract Works and the equipment, materials and installations shall be suitable for these conditions:

Altitude	1798M above Sea level
Mean Maximum Temperature	28.7°C
Mean Minimum Temperature	12.8°C
Range of Relative Humidity	48% -93%
Salt in the atmosphere	0.02%
Mean Rainfall	897mm

### **3 Operating Conditions**

The equipment and all components shall be suitable for the operation in ambient conditions of 5<sup>0</sup> C to 40<sup>0</sup>C and up to 100% relative humidity

- i) in an unheated ventilated building
- ii) in the open air as specified

Unless otherwise stated all ratings of equipment and components shall be interpreted as site rating and NOT sea level or other ratings.

### **4. Functional Objectives**

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 649.

The generating set is required for standby duty and will be connected to the switchboard through a circuit. It shall have an automatic mains failure control, appropriately interlocked with the other incoming supply. Provisions shall be made in the control circuit of the generator for automatic and remote push button control, including the terminals and cable gland for all external cables, which will be supplied by others, where specified. It shall also be possible to start, operate and stop the set manually, independent of any automatic features.

Within the operating conditions specified in part 3 above the set shall be capable of starting and accepting full load within the shortest possible time, and in any case, in not more than 10 seconds. Any special features included to achieve this shall be stated in Section F.

### **5. Scope of the Contract Works**

The work covered by this Specification includes the design, manufacture, and supply, and delivery, installation, commissioning and testing to the satisfaction of the Engineer and maintenance for a period of twelve months of a new generating set complete with all necessary ancillary equipment.

## PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

The equipment to comprise 350KVA, 415 volts/3 phase /50Hz prime rated diesel generator set with all integral accessories, and all necessary equipment for the safe and efficient working of the set. The diesel generator set will be site rated at level of 1798 metres, Kenya Datum.

Diesel generator set to include:

- a) Push button starting, starting battery and mains power supply trickle charger to be included.
- b) 72 hour operational running capacity auxiliary fuel oil storage tank, loose transfer pump and duplex oil strainer.
- c) An integral belly/ base fuel tank for daily service with an operational running capacity of 8 hours
- d) All interconnecting pipe work, valves and fittings between the storage tank, base tank and the diesel engine.
- e) An automatic generator control unit
- f) A diesel generator control cubicle
- g) Acoustic enclosure/ sound attenuated canopy
- h) All local wiring
- i) Maintenance tools and spare parts as specified.

### **6 Performance Objective**

The output rating of the set in KVA, the voltage, the number of phases and the frequency shall be as specified in Bill No.2 Schedule 1 of the Bills of Quantities.

Within the operating conditions specified the 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 rating for a period of one hour in any 12 hour period.

The steady state voltage shall be maintained within 2 ½ % of the rated voltage under control of the voltage regulator between the cold start ambient conditions and the maximum working temperature, 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 + 15% of the rated voltage and shall return to within +/- 3% within 3 seconds and to within 2 ½ % of rated voltage within 1 seconds. On starting the voltage overshoot shall not exceed 15% and shall return to within 3% in not more than 3 seconds.

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 110% of the rated frequency and it shall return to within 105% of the rated frequency within 3 seconds. The resultant steady state frequency shall return to 104% 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.

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

The deviated interference shall be suppressed to the limit specified in BS 800 and BS 833.

### **7. Generating Set Arrangement**

Unless otherwise indicated the set and its auxiliaries shall be mounted on sufficiently substantial underbase. All items which must be held in correct relative alignment shall be located by means of dowels.



The set shall be designed and supplied for operation bolted to the floor on robust anti-vibration and shock absorbing devices. They 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 surrounding.

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.

## **8. Diesel Engine**

### **8.1 General**

The engine shall comply in design and performance with BS.649 "Diesel Engines for General purposes" or its approved equivalent. The engine shall be designed for satisfactory operation on fuel oil and lubricating oils complying with BS. 2869.

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 with a changeover cock incorporating pressure by-pass, so that the oil flow to the engine is maintained if the filter should choke. 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. Manual lubrication of any part of the engine will not be accepted. The capacity of the lubricating oil system shall be sufficient to enable the engine to run continuously for 12 hours at any load without replacement.

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

Air filters complying with KS 06-294: 1986, Grade 'A' and Grade 'B' suitable for use in a dusty atmosphere shall be fitted on the engine air intake(s)

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

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 operation 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.

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. The engine may be naturally aspirated as pressure charged, or as indicated.

The starting shall be by means of electricity supplied from a starter battery. The starter motor shall be of axial type, de-energizing by a device operated from the engine. A means of manual starting shall also be provided. Suitable means shall be provided for running by hand the engine main shaft and the associated generator to facilitate inspection and overhaul.

If weekly test runs are insufficient to prevent the drying out of the bearings, means shall be provided to ensure that the bearing surfaces are adequately and automatically wetted with lubricating oil either periodically or immediately prior to every start.

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

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 square millimeter to avoid carbonization of oil.

An efficient exhaust silencer with adequate draining facilities shall be supplied, and shall either be mounted on the set or installed in a generator room constructed as shown on the drawing indicated. The exhaust silencer system shall be so arranged that it may be readily relocated if required. Where any additional piping bends and fittings are specified, the manufacturer shall advise on any problems involved.

## **8.2 Fuel Oil System**

An auxiliary fuel storage tank whose minimum capacity shall be sufficient to run the engine continuously on full load for 72 hours shall be installed in the position indicated in the contract drawing. It shall be supplied complete with supports.

The tank shall be fitted with a hand operated fuel with a flexible suction hose to permit filling from a drum on the floor.

A three way cock shall be fitted in the line from tank to the engine to enable the fuel to be supplied from a source other than the storage tank.

The position of the cock shall be clearly marked 'MANUAL, AUTOMATIC, OFF' as applicable.

A duplex oil filter shall be supplied between the storage tank and the diesel engine. The duplex filter shall be capable of being cleaned without dismantling, or in interruption of the fuel flow, and shall be easily maintainable. The tank shall be equipped with a graduated dipstick, a clearly visible contents' gauge (not of the site glass type) and with drain, vent, overflow and inlet and outlet connection.

The set shall also have an integral belly/base fuel tank for daily services with an operational running capacity of 8 hours.

## **8.3 Lubricating Oil System**

An engine driven integral gear type lubricating oil pump shall be provided. The lubricating oil system shall include an oil cooler and fine mesh filters, together with devices to indicate lubricating oil pressure and to initiate a 240 volt A.C. Lubricating oil Low pressure Alarm, Lubricating Oil High Temperature Alarm and Cooling Water High Temperature Alarm.

As separate 240 volt A.C. Motor driven automatic lubricating oil priming pump shall be provided for intermittent operation when the diesel is lying idle.

## **8.4 Starting of Engine**

The diesel generator set shall have facilities for local and remote push button starting, with a Local/ Remote/ Automatic selector switch at the local panel.

On mains failure the engine shall be capable of being automatically started from battery located near the generator set.

The battery shall be complete with drip tray and trickle charger.

All necessary relays, contacts, switches and miscellaneous items for the starting sequence shall be supplied and installed in the local control panel.

The system shall be designed to give maximum reliability in starting.

The Contractor shall state in detail his proposals to ensure reliable starting and prevention of deterioration of the diesel engine, generator and exciter during idle periods.

All manually operated valves and controls on whose setting the correct operation of the automatic starting equipment depends shall be provided with locking devices.

## **8.5 Cooling System**

The engine may be air or water cooled unless a preference is indicated.

### **8.5.1 Air Cooling of Engine**

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 649 and under the conditions of Section 3.

The engine shall be so designed that the cooling air discharges into or is drawn through a reasonably 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 may be readily attached when necessary, to enable hot air from the cooling system to be discharged outside the building.

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.

### **8.5.2 Water Cooling of Engine**

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

The radiator shall be mounted on the set and the fan(s) shall be mechanically driven from the engine. Where indicated the radiators shall be suitable for remote wall or floor mounting, in which case the fan shall be electric motor driven from a supply similar in voltage, phase and frequency to the alternator output and shall be started on line.

Where remotely mounted, the fan shall only operate when generating set is running and shall be controlled by a thermostat mounted in the radiator such that the fan motor will start on rising temperature 50°C and stop on falling temperature.

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. 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 drive shall be capable of transmitting the full load with one belt removed.

Circulation by thermo-syphon will be accepted provided the engine will operate under the conditions of section 6 and in accordance with BS 649.

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 sealed or pressurized 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 8.3.

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

A radiator make-up/expansion tank, fitted with float control inlet, shall be provided. If a sealed or pressurized unit is offered the tank may be dispensed with.

Where indicated provision shall be made on the radiator framework to permit the attachment of ducting for the discharge air.

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

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.

## **8.6 Governing System**

Governing shall conform to B.S. 640 Class A. The governor shall control the frequency within the limits stated in Section 6 Part. Manual speed adjustment shall be provided over a range of +/-15% of the rated speed at any load. The governor system shall be of the mechanical or hydraulic type. In addition the engine shall be fitted with an approved overspeed trip device which shall operate independently of the normal speed governor and shall act directly upon the fuel supply to the engine.

The overspeed shall act at a speed of 12% to 15% in excess of normal operating speed.

### **8.7 Exhaust System**

The diesel engine shall be provided with a suitable exhaust system for horizontal discharge outside the diesel generator room.

The silencer shall be of spark arresting type and shall be equipped with cleaning and draining arrangements.

If an exhaust driven turbo-charger is supplied it shall include air intake filters, mani-folds and outlet manifolds.

All necessary ducting, piping, supports and lagging required for the system shall be included.

Weatherproof wall boxes permitting expansion shall be fitted where the exhaust piping passes through the building wall or roof. Pipe work shall be connected at site by butt weld connections or use of flanged joints. The use of screwed connectors shall be avoided.

Flanges shall conform to the appropriate Table of B.S.10: 1962. Welding of flanges at site shall be carried out in accordance with B.S.806. The faces of flanges shall be machined and the backs shall be machined or spot faced to receive the bolt heads.

Valves and fittings shall be of approved design and manufacture and shall be subject to the same tests as the highest pressure piping or vessel to which they are connected.

### **8.8 Engine Instruments**

Unless otherwise indicated the following instruments shall be provided:

- (a) A lubricating oil pressure gauge
- (b) A running hours meter
- (c) A tachometer
- (d) A water thermometer
- (e) An exhaust gas pyrometer or thermometer mounted near the mani-fold
- (f) Lubricating oil thermometers on the inlet to and outlet from the engine, when a lubricating oil cooler is fitted
- (g) Exhaust turbo-blower pressure gauge(s) as applicable

### **8.9 Pipe work, Valves and Fittings**

All piping shall comply with requirements of KS-259:11989 for mild steel pipes.

Provision shall be made for ready handing of all parts of the plant during assembly or disassembly of the unit.

Adequate provision shall be made for attaching lifting devices, slings and eyebolts.

**9. The Generator (Alternator and Exciter)**

**9.1 General**

The generator shall comply with B.S.2613:197, for service in tropical conditions, and shall withstand being idle for considerable periods without any harmful drop in the insulation resistance.

The generator shall have a prime rated net output of 350KVA as specified in the schedules of the Bills of Quantities, at 0.8 lagging power factor, 415 volts, 3 phase, 4 wire, 50 Hertz with brushless rotating rectifier excitation system and voltage regulator. It shall be directly coupled to the engine and be sized such that it will accept the maximum output of the engine including overload. The output voltage shall be maintained within plus or minus 2 ½ % from no load to full load conditions. The alternator shall be capable of operating within the range of plus or minus 15% of the nominal voltage according to the automatic voltage regulator.

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

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 necessarily drying out the insulation.

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

**9.2 Excitation**

Excitation shall be by means of brushless direct coupled exciter armature.

The alternators shall be designed for an excitation voltage at full load of not less than 50 Volts unless prior approval is given.

**9.3 ELECTRICAL CONTROL PANEL**

The Automatic Mains Failure control panel shall be provided and fitted with the following:-

- a) Two four pole contactors and two TP & N incoming MCCB's each of suitable rating for controlling the supply from the mains transformer and standby generator.
- b) An automatic voltage regulator for the set.
- c) Control equipment as necessary including phase failure protection relay for both the mains supply and the generator supply (with both under and over voltage protection) and phase sequence protection relay for the mains supply all to fulfill the functional requirements and automatic changeover as detailed in Part 9.3.2
- d) One ammeter and a selector switch to measure each phase current and neutral current

- e) One voltmeter and a selector switch to read line to line and line to neutral voltage
- f) A frequency meter

The meters shall comply with BS 89, table 7.

### **9.3.1 General**

The set is to be used for mains failure duty and an 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), all auxiliaries, fault warnings and shut downs. All faults, warning and shut-downs shall be separately indicated. There shall be test facilities for indication lamps, etc, preferably by means of a single test button.

Means shall be provided for isolating all supplies to the starting panel either by an isolating switch or by withdrawable fuses.

When the set is stopped other than under lock-out conditions, it shall be self-resetting ready for the next start.

The set shall be suitable for starting by manual means. e.g. by cranking or direct operation of the starter solenoid. All switches and push buttons shall be clearly marked to indicate their function.

It shall be possible to operate the 'Start' and 'Stop' buttons and to see the 'Set Failure' indications without opening the panel doors.

### **9.3.2 Automatic Changeover Controls**

The controls shall be installed and wired in the machine control panel.

The control shall be provided such that on failure of the normal electricity supply, it will automatically initiate the starting of and effect the transfer of load to the standby generator. The schematic for the controls shall be approved by the Electrical Engineer before manufacture commences.

Where failure of the normal supply is referred to, it shall be defined as follows:

- a) Complete loss of voltage in one line Or in all the three lines
- b) Falling of voltage below 85% of the normal voltage between two lines or line and neutral
- c) Voltage overshoot to 110% of the normal voltage between two lines or line and neutral
- d) Incorrect phase sequence

On failure of the normal supply, the unit shall operate in the following manner:

- (a) After a delay, adjustable from 0 to 15 seconds (to avoid operation by a transient dip in voltage) a signal shall be given to start the standby generating set.
- (b) On receipt of a signal from the standby generating set that it is ready to take load, and providing that the failure of the normal supply still persists, the normal supply contactor in the control panel shall open and the standby contactor shall close. If the normal supply has been restored before the changeover has taken place, the contactor shall not operate and the starting relay contacts shall open to initiate the shutting down of the standby generating set.

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 up to 120 second) the standby contactor shall open and the normal supply contactor shall close; the starting relay contacts shall then open to shut down the generating set.

Provision shall be made so that automatic return to normal supply can be prevented if required.

Once a start signal has been sent to 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.

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.

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:

- 'Main Supply Available'
- 'Generator Supply Available'
- 'Mains Supply on load'
- 'Generator Supply on load'

The standby generating set should be complete with an integrated Programmable logic controller (PLC) for connecting the set to the paralleling and synchronizing panel.

## **9.4 Lock out**

### **9.4.1 General**

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

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

9.4.2 Failure of the circuits concerned in sub-section 9.4.1 (b) to 9.4.1(e) shall cause a set to shut down. Reset of lock out shall be by hand.

## **9.5 Fault indication**

Each lock-out detailed in section 9.4.1 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.



### **9.6 Starting Battery and Charger**

The battery shall be 24 volts and capable of with-standing 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.

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

A single phase supply for battery charging shall be available from the main M.V SWITCHBOARD.

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 may also supply the load of any automatic starting and control equipments, and an additional load up to 24 watts 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 charger and discharge current excluding the starter motor current.

### **9.7 Wiring and Earthing**

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 coded and terminated with lugs or eyes or to be soldered, the terminations shall be clearly marked with the numbers and letters of the 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.

All metal work housing electrical equipment shall be bonded to a brass earthing terminal and connected to station Earth and as detailed in the schedule.

### **9.8 Contactors**

Contactors shall have magnetic circuits designed for a.c or d.c operation and shall be rated in accordance with ks 04-182:1982. 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.

### **9.9 Relays**

Relays shall preferably be of sealed type mounted in approved plug-in bias 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.

Time delays, if of the pneumatic type, shall operate on filtered air. The thermal type of time delay relay will not be accepted.

### **9.10 Fuses**

Fuses shall comply with KS-183:1978. A spare fuse cartridge for each pole shall be mounted inside each equipment

### **9.11 Rectifiers, Capacitors and solid State components**

Rectifiers, capacitors and solid state components shall be suitable for any transient voltage and high currents likely to be uncounted during the operation of the equipment and for the internal operating temperature of the enclosures at the specified maximum external ambient temperature.

### **9.12 Enclosures for 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.

### **9.13 Digital Master Controller and Paralleling and Synchronizing Panel (synchronizer)**

The digital master controller shall be a microprocessor based capable of providing supervisory and power transfer functions to more than one set with digital paralleling controls. It shall be configurable for use with many power

system architectures, including isolated bus paralleling of generator sets in prime power or standby applications, and also configurable for use in applications that require control of a normal source main circuit breaker or circuit breaker transfer pair. The control system shall include an easy-to-use, full-function Operator panel and LED-type remote annunciator. The Common bus and transfer pair system configurations shall include a system auto/manual switch and manual breaker control switches. The digital master controller shall have the following features; True RMS bus metering, Load add and load shed sequence control, LED system status annunciator, Load demand control system, operator control panel and building management system interface. The digital master controller shall be complete with the monitoring software.

The paralleling synchronizing panel shall provide load shedding and load sharing between the synchronized sets running simultaneously in parallel. The panel shall be programmable and be able to give the power parameters such as load demand, current drawn, voltage levels, frequency and power factor via high resolution color touch screen. The panel shall be able to output the system alarm history. It shall be password protected and only accessed by authorized personnel and protect the configuration from unauthorized users.

#### **10 Lifting Gear and Handling.**

Provision shall be made for ready handling of all parts of the plant during assembly or disassembly of the unit. Adequate provision shall be made for attaching lifting devices, slings and eyebolts.

#### **11 Commissioning**

The 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.

The following tests and checks as applicable shall be carried out by the contractor in the presence of the electrical engineer or his representative.

- a) 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.
- b) Check water and sump oil levels and that the water jacket and radiation heaters (if fitted) are in working order.
- c) Check the battery electrolyte levels and the specific gravity.
- d) Examine the containers in which the fuel and lubricating oils were delivered and check that the type and grade of oils are as recommended for the unit.
- e) Ensure that sufficient fuel oil is in the fuel tank for a two hours test run.
- f) Check that all radiator and engine block water drain points are free from sludge and other blockages.
- g) Check engine bolts, main drive coupling, valve clearance, fuel pumps settings, governor settings, pipeline connections, water hose, exhaust couplings, flexible pipe work etc, and where a separate cooling water tank is fitted, that the water levels is satisfactory and the ball valve and overflow work.
- h) Check all outgoing connections on the generator and the control panel. All lugs for principal connections shall have clean and bright contact surfaces. A suitable abrasive shall be used where necessary.
- i) Check access panels and doors for proper opening and closing and for functioning of any interlocks fitted.
- j) 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 up to normal speed. Check that the main 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 auxiliary contact during the time the engine is running.

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- k) 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 engine tachometer, where both are fitted
- i) Stop engine by turning selector switch to off position and verify that the generator contactor opens at between 95% and 85% of normal voltage. Re-check water and oil levels.
- m) 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 restoration of the mains supply and the contactors operate correctly. Check voltage sensing and time delays on each phase in turn and also 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 condition is undesirable and tests calling for such operation should be carried out in as short time as possible consistent with thoroughness.

- n) Operate the necessary isolators and switches to put the set on standby for essential services network with 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 three phases are satisfactory.
- o) Run the set at various loads for periods totaling at least 30 minutes. Check that the voltage and frequency are being maintained within the required limits with large alterations of load. 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 manufacturers recommendations and adjust charging rates if necessary.
- p) Check that the various engine safeguards operate satisfactorily.
- q) Check the vibration absorbing devices for proper operation and that performance of all flexible connections, both mechanical and electrical, is satisfactory.
- r) When all tests are satisfactory and agreed with the Engineer or his representative, the lubricating oil and water levels shall be finally checked, the fuel oil tank replenished and set left in normal operating order.
- s) An initial supply of all lubricating oils and greases shall be provided by the Contractor.
- t) 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 serving of the set during the 12 months maintenance period referred to in the general specifications.

**INFORMATION TO BE SUPPLIED BY THE TENDERER**

**1. GENERAL**

- a). The tenderer shall complete Part 2 of Section F in full with details of the set he is offering.
- b). Any equipment which he wishes to offer but which does not comply with the specification shall be fully detailed in Part 3 of section F together with details of any other deviation or omissions which he may wish to make.

Any tender which is submitted without filling these sections will be deemed non-responsive.

- c). The tenderers shall be required to submit, together with their tenders, brochures detailing technical specifications of the generator set they intend to supply. Any tender which is submitted without the brochures will be deemed non-responsive

**2. INFORMATION OF THE SET TO BE SUPPLIED**

ITEM	EQUIPMENT	DETAILS
1.	<p><b><u>Diesel Engine</u></b></p> <p>Make</p> <p>Type</p> <p><b>Net continuous rating (B.S.649)</b></p> <p>(a) at sea level</p> <p>(b) at site</p> <p><b>Speed</b></p> <p><b>Supercharger</b></p> <p>Make</p> <p>Type</p> <p><b>Air cooling</b></p> <p>Quantity of air required</p> <p>Details of ducting</p> <p><b>Water cooling</b></p> <p>Details of water cooling circuits</p> <p><b>Radiator:</b></p> <p>Make</p> <p>Type</p> <p>Length</p> <p>Breadth</p> <p>Height</p>	<p>KVA</p> <p>KVA</p> <p>Rev/min</p> <p>Not Applicable</p> <p>To be Applicable</p> <p>mm</p> <p>mm</p> <p>mm</p>

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ITEM	EQUIPMENT	DETAILS
2.	Aspiration Method Quantity of air required <u><b>Auxiliaries</b></u> 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 Exhaust thermometer Position Starting Battery Battery charger Immersion Heater	
3.	<u><b>Lubrication</b></u> Recommended oil (s) Sump Elsewhere (state where)	Grade quantity (litres)
4.	<u><b>Alternator and Exciter</b></u> Make and type Bearings Insulation class (BS.2757)	
5.	<u><b>Electrical Control Panel</b></u> Main circuit breaker Bypass switches Automatic changeover contactor Automatic voltage regulator	Amps Amps Amps Volts

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ITEM	EQUIPMENT	DETAILS	
	Ammeter selector switch		
	Voltmeter selector switch		
	Frequency meter		Hertz
	Ammeters ----- No.		Amps
	Voltmeters -.....No.		Volts
	Power factor meter		KVAR
	Other equipment – give details		
	<ul style="list-style-type: none"> <li>PLC for synchronization</li> </ul>		
6.	<p><b><u>Performance data</u></b></p> <p>Fuel consumption</p>	<p><u>Rated output</u></p> <p>%</p> <p>Litres/hour</p> <p>110</p> <p>100</p> <p>75</p> <p>50</p>	<p><u>Consumption</u></p>
	Maximum output	<p><u>Ambient temp.</u></p> <p><u>KVA</u></p> <p>°C</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p>	<p><u>Out-put</u></p>
6.	<p>Performance Data (cont'd)</p> <p>Voltage regulation</p> <p>Frequency regulation</p> <p>Time to accept 75% full load from 5°C</p> <p>Time to accept 100% full load from 5°C</p> <p>Time to accept 100% full load from 40°C</p>		<p>%</p> <p>%</p> <p>Seconds</p> <p>Seconds</p> <p>Seconds</p>
7.	<b><u>Physical Details</u></b>		

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ITEM	EQUIPMENT	DETAILS		
8.	Auxiliary fuel storage tank for 72 hour operational running capacity	Litres		
	Size of set	mm long high	mm wide	mm
	Total weight of set	Kg.		
	Overall dimensions of set	mm long high	mm wide	mm
	Weight of heaviest component	Kg.		
	Weather proofing			
	Integral belly/base fuel tank for daily service for 8 hour operation capacity	Litres		
	<p><b><u>Operational Details</u></b></p> <p>Description of Operation Sequence of the automatic control</p> <p>Details of drawings, literature, etc., included with tender.</p>			

**3. DEVIATIONS FROM THE SPECIFICATION**

The tenderer shall give details of any equipment which does not meet the specification, or any other deviations, omissions, additions or alternatives in respect of the set which he is offering.

If none, write none

**TECHNICAL SCHEDULE**

**1. General Notes to the Tenderer**

- 1.1 The tenderer shall submit technical schedules for all materials and equipment upon which he has based his tender sum.
- 1.2 The tenderer shall also submit separate comprehensive descriptive and performance details for all plant apparatus and fittings described in the technical schedules. Manufacturer’s literature shall be accepted. Failure to comply with this may have his tender disqualified.
- 1.3 Completion of the technical schedule shall not relieve the Contractor from complying with the requirements of the specifications except as may be approved by the Engineer.

**TECHNICAL SCHEDULE**

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

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>MANUFACTURER</b>	<b>COUNTRY OF ORIGIN</b>	<b>REMARKS (Catalogue No. etc.)</b>
A	Generating Set			
B	Automatic Mains Failure Panel			
C	Cables			
D	Auxiliary Fuel Tank			
E	Circuit Breakers			
F	Fuel Pumps			

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



**CONDITIONS OF SUB-CONTRACT AND APPENDIX**

The successful tenderer shall be required to enter in a sub- contract agreement with the main contractor under the terms of the standard KABCEC conditions of subcontract which shall be amended and completed as follows:

Clause 28: Fluctuations; Sub-clause 28.2-28.4 shall be omitted. The contract shall be a fixed price contract.

The appendix shall be completed as follows:

<b>APPENDIX</b>	<b>Clause</b>
Name of sub-contractor’s insurers	6.0.....
Name of sub-contractor’s surety	7.0.....
Amount of surety	7.0: ..... <b>10% of contract sum</b>
Period of possession of site	8.1.....
Date of commencement of works	8.2.....
Date for practical completion	8.2.....
Interval for application of payment certificates	23.1..... <b>1 month</b>
Minimum amount of payment certificate	23.4..... <b>Kshs. 500,000.00</b>
Percentage of certified value retained	23.6..... <b>10%</b>
Limit of retention fund, if any	23.6..... <b>5%</b>
Name of the sub-contractor’s bank for purposes of interest calculation.	23.7, 23.8.....
Defects liability period	23.11..... <b>12 Months</b>
Period of final measurement and valuation	23.12..... <b>12 Months</b>
Damages of delay in completion	27.1 at the rate of Kshs.....
	<b>.. As per Main contract</b>

## **BILL OF QUANTITIES**

- (i) The Tenderer shall complete all the BQ unit rates schedules. The BQ unit rates schedule shall be read in conjunction with the specifications and the drawings.
- (ii) The total prices in the main summary of price schedules shall be deemed to include all obligations under the Contract including and not limited to supply of materials equipment, apparatus, fittings, spares, tools, insurance, delivery to site, storage, installation, testing and commissioning in accordance with this specification.
- (iii) Any prices omitted from any section or part of price schedule shall be deemed to have been included in another item, section or part.
- (iv) All prices shall be duty paid and shall also be inclusive of all taxes current at the time of tendering.
- (v) Where client wishes to supply some items of work the contractor will be required to quote for labor rate for fixing the item.

**PRICE SCHEDULE No. 1.0 - CONTRACT PRELIMINARIES**

Item	Description	Qty	Unit	Rate (Kshs)	Cost (Kshs)
1	Discrepancies clause 1.02				
2	Conditions of contract Agreement clause 1.03				
3	Payments clause 1.04				
4	Site location clause 1.06				
5	Scope of Contract Works clause 1.08				
6	Extent of the Contractor's Duties clause 1.09				
7	Firm price contract clause 1.12				
8	Variation clause 1.13				
9	Prime cost and provisional sum clause 3.14 (insert profit and attendance which is a percentage of expended PC or provisional sum.)				
10	Bond clause 1.15				
11	Government Legislation and Regulations clause 1.16				
12	Import Duty and Value Added Tax clause 1.17 (Note this clause applies for materials supplied only)				
13	Insurance company Fees clause 1.18				
14	Provision of services by the Main contractor clause 1.19				
15	Samples and Materials Generally clause 1.21				
16	Supplies clause 1.20				
17	Bills of Quantities clause 1.23				
	<b>Sub-Total Carried Forward to the next Page</b>				

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Item	Description	Qty	Unit	Rate (Kshs)	Cost (Kshs)
	<b>Sub-Total Brought Forward from the Previous Page</b>				
18	Contractor’s Office in Kenya clause 1.24				
19	Builder’s Work clause 1.25				
20	Setting to work and Regulating system clause 1.29				
21	Identification of plant components clause 1.30				
22	Working Drawings clause 1.32				
23	Record Drawings(As Installed) and Instructions clause 1.33				
24	Maintenance Manual clause 1.34				
25	Hand over clause 1.35				
26	Painting clause 1.36				
27	Testing and Inspection – manufactured plant clause 1.38				
28	Testing and Inspection – Installation clause 3.39				
29	Storage of Materials clause 1.41				
30	Initial Maintenance clause 1.42				
	<b>Sub-Total Carried Forward to the next Page</b>				

Item	Description	Qnt	Unit	Rate (Kshs)	Cost (Kshs)
	<b>Sub-Total Brought Forward from the Previous Page</b>				
31	Local and other Authorities notices and fees clause 1.60				
32	Temporary Works clause 1.63				
33	Patent Rights clause 1.64				
34	Mobilization and Demobilization Clause 1.65				
35	Supervision by engineer and site meetings clause 1.67				
36	Allow for profit and Attendance for the above (item 35)				
37	Amendment to Scope of Contract Works Clause 1.68				
38	Contractor Obligation and Employers Obligation clause 1.69				
	<b>Total Carried Forward to Price Summary Page</b>				-

**Bidders MUST either insert percentage or indicate as NIL for the following clauses:**

(1). Attendance Upon Tradesmen, etc. **(Insert percentage only)** clause 1.58 of section C

.....%

(2). Extended Preliminaries **(Insert percentage only)** Clause 1.66 of section C

.....% per month

**BILL NO.2**

**SCHEDULE 2 - GENERATING SET**

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS
1.1	Supply, deliver to site, install, test and commission a prime rated 350KVA 3 phase, 415V, 50Hz diesel generating set with a continuous power factor of 0.8 lagging and as fully described in the particular specifications. The generator set is to be complete with a sound attenuated canopy and an integral base/belly daily service fuel tank with an operational running capacity of 8 hours. The generator set set is to be complete with a Programmable logic controller (PLC) for connecting the set to the paralleling and synchronizing panel.	1	No.		
1.2	Supply, deliver to site and install a steel exhaust pipe of not less than 14 SWG and of adequate diameter running from 2No. the generating sets to the outside of the generator house	60	M		
1.3	Connect the exhaust pipe above in item 1.2 using steel pipes of adequate diameter, and flexible piping off engine exhaust manifold complete with heavy duty silencer	1	No.		
1.4	Supply and install, for the set, 1 No. steel cored copper earth rods, 1200 mm x 12 mm threaded for extension, connected by brass clamps to 10 metres of 10mm sq copper cable laid in trenches of minimum depth 300 mm and fixed to the outside 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 and to the electrical engineer's approval	1	No.		
1.5	Allow for training of client's staff (3No. Technicians) on the operation and maintenance of the generating set.	Item			
1.6	Allow for testing and commissioning with the Generator set's tank full of fuel	Item			
1.7	Allow for bench test for full load test at the supplier's workshop.	Item			
1.8	3x(4core 95mm sq PVC/SWA/PVC copper cable)	80	M		
<b>SUB-TOTAL C/F TO PRICE SUMMARY PAGE</b>					

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS
	<p><b>Supply, deliver to site, install, test and commission the following:</b></p>				
2.1	<p>An electrical control panel complete with an incoming 500A TPN MCCB main switch with current adjustable of 0.5I-1.0I and contactors for automatic change over operation and complete with all other control accessories as fully described in clauses 21 to 22 of the particular specifications</p>	1	No.		
2.2	<p>Suitable rated manual by-pass switch with clearly labeled <b>NORMAL-OFF-BYPASS</b> positions, <b>and shall such be wired that when the switch is on either OFF or BYPASS position, the generator shall receive no signal to start</b></p>	1	No.		
2.3	<p>240V AC/12V DC mains power supply trickle battery charger as specified in the specifications. The trickle charger shall charge the battery when the set is on <b>IDLE mode</b>, otherwise when the set is <b>RUNNING</b>, the battery shall be charged by the <b>generator charger</b>. Wiring shall be done such that the two chargers shall not operate at the same time.</p>	1	No.		
2.4	<p>12 volts battery as specified in the particular specifications</p>	2	No.		
<b>SUB-TOTAL C/F TO PRICE SUMMARY PAGE</b>					

ITEM	DESCRIPTION	UNIT	QTY	RATE	KSHS	
	<b>For the supply to the site of the following spare parts and lubricators:</b>					
3.1	Oil Filters	No.	3	}		
3.2	Air Filters	No.	3			
3.3	Fuel Filters	No.	3			
3.4	Set of Fan belts to suit the set	No.	1			
3.5	Set injectors and injector nozzles	No.	1			
3.6	10 litres container of sump oil of grade.....*	No.	1			
3.7	2 kilogram grease in a tin of grade .....*	No.	1			
3.8	10 litre plastic container of distilled water	No.	1			
3.9	20 litre of engine oil in a tin of grade .....*	No.	1			
3.10	<i>1 year generators service contract **</i>					
3.11	Any other spare parts recommended by Tenderer **					
	*The tenderer to fill in the Grade quality to be supplied					
	**The tenderer to fill in the details and price of items but the price not to be included in total carried forward to summary page					
<b>SUB-TOTAL C/F TO PRICE SUMMARY PAGE</b>						



**BILL NO.5**

**SCHEDULE 5 – AUXILIARY FUEL TANK**

ITEM	DESCRIPTION	QTY	UNIT	RATE	KSHS
5.1	Supply, deliver to site and install, to the approval of the project manager, and connect to the daily service base/belly fuel tank, an auxiliary fuel tank with level indicator and with an operational running capacity of 72 hours. The tank is to be complete with stand and all interconnecting G.I pipe work.	1	No		
5.2	Supply, install, test and commission a manually operated fuel pump complete with all interconnecting accessories and G. I piping	1	No		
5.3	Supply, install, test and commission an electric 240Vac fuel pump complete with DOL starter and isolator and including all interconnecting accessories and G. I piping	1	No		
<b>SUB-TOTAL C/F TO PRICE SUMMARY PAGE</b>					

**SUMMARY PAGE**

Item	Description	QTY	UNIT	RATE	Amount (Kshs)
1	Sub-Total for Bill No.1 - Contract preliminaries				
2	Sub-Total for Bill No.2: Schedule 1 - Generating Set				
3	Sub-Total for Bill No.3: Schedule 2 - AMF Panel				
4	Sub-Total for Bill No.4: Schedule 3 - Recommended Spare Parts and Lubricators				
5	Sub-Total for Bill No.6: Schedule 4 - Auxiliary Fuel Tank				
6	Contingency amount to be expended at the discretion of the Engineer.				<b>1,000,000.00</b>
<b>Total for the Generator Works (Incl. VAT) Carried Forward to Form of Tender</b>					

**TOTAL AMOUNT IN WORDS**

.....  
 .....

**TENDERER'S NAME & STAMP**

.....  
 .....

SIGNATURE ..... DATE.....

P.I.N No.,..... V.A.T CERTIFICATE No.....

PROPOSED LIBRARY FOR KARATINA UNIVERSITY: GENERATOR INSTALLATION

**WITNESS..... ADDRESS.....**

**SIGNATURE OF WITNESS..... DATE.....**