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RESEARCH ORGANIZATION
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TENDER NO KALRO/TRI/INT TENDER/01/2015-2016

FOR

**SUPPLY OF MACHINERY AND EQUIPMENT FOR THE
PROPOSED**

**TEA RESEARCH AND DEVELOPMENT FACTORY KALRO, TEA
RESEARCH INSTITUTE IN KERICHO, KENYA**

(PHASE ONE)

JULY 2015

Closing date; August 19, 2015

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SECTION I INVITATION TO TENDER

TENDER REF NO; KALRO/ TRI/ INT TENDER/ 01/ 2015-2016

TENDER NAME; SUPPLY, INSTALLATION, TRAINING AND COMMISSIONING OF MACHINERY AND EQUIPMENT FOR THE PROPOSED TEA RESEARCH AND DEVELOPMENT FACTORY TO KALRO TEA RESEARCH INSTITUTE IN KERICHO, KENYA (PHASE ONE)

- 1.1 Kenya Agriculture and Livestock Research Institute (KALRO) invites sealed tenders from eligible candidates for supply, Installation, Training and Commissioning of machinery and Equipment for the proposed Tea Research & Development Factory to KALRO Tea Research Institute, in Kericho, Kenya.
- 1.2 Interested eligible candidates may view/ download tender document at Ag Supply Chain Manager Office room 151 during normal office hours or from KALRO Website www.kalro.org or Treasury portal www.supplier.treasury.go.ke
- 1.3 A complete set of tender documents downloaded from website are free of charge, while documents collected from Supply Chain Manager's office shall attract a non-refundable fees of Kenya Shillings 1,000.00 or United States dollar eleven (US \$11) deposited to KALRO bank account as below;

Account name	KALRO Deposit
Bank	Kenya Commercial Bank
Branch	Kenyatta International Conventional Center (KICC)
Account	1102288365

The deposit slip must bear the name of bidding firm to be presented to KALRO Cashier Office where official receipt will be issued upon verification of the deposit slip with the bank by KALRO cashier.

Tenderers who opt to download the document from the website MUST register their details with KALRO via email or address provided in the tender document in order to receive clarifications and/ or addenda.

- 1.4 Prices quoted should be net inclusive of all taxes, must be in Kenya Shillings or United State Dollar (US\$) and shall remain valid for one hundred and twenty (120) days from the closing date of the tender.

- 1.5 The Bills of Quantity are structured into sixteen (16) different lots of machinery and equipment that can be supplied by a given bidder. Bidders are free to quote for as many lots as they wish, provided that they have the experience and capacity to manufacture and/or supply the equipment therein.
- 1.6 All items in a given lot must be priced for the tender to be considered responsive.
- 1.7 The bidder must specify the lot or lots that they have quoted for in Price schedule Form Tender.
- 1.8 During evaluation, bidders will be expected to demonstrate that they have the capacity and experience to manufacture and/or supply all items of machinery and equipment in the lot or lots that they have quoted for. Failure to do this or any evidence of subcontracting shall result in outright disqualification of the bid/bidder.
- 1.9 Bidders must give references of past client for whom they have successfully installed the equipment/machinery in any lot that they have quoted for. The Client shall reserve the right to verify the references directly with the clients.
- 1.10 Completed tender documents are to be enclosed in plain sealed envelopes marked with tender reference number and be deposited in the Tender Box at the reception area Kenya Agriculture & Livestock Research Organization Headquarters, Kaptagat Road, Loresho or be addressed to: -
**Director General,
Kenya Agriculture & Livestock Research Organization
P O Box 57811-00200
Nairobi, Kenya**
so as to be received on or before **August 19, 2015 at 10am** East Africa time
- 1.11 Tenders will be opened immediately thereafter in the presence of the Candidates or their representatives who choose to attend at KALRO Conference room

Ag Supply Chain Manager
For; Ag Director General – KALRO

SECTION II - INSTRUCTIONS TO TENDERERS
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SECTION II – INSTRUCTIONS TO TENDERERS

2.1 Eligible Tenderers

- 2.1.1 This Invitation for Tenders is open to all tenderers eligible as described in the Appendix to Instructions to Tenderers. Successful tenderers shall complete the supply, install, and commissioning of the equipment by the intended completion date specified in the tender documents.
- 2.1.2 The procuring entity's employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender unless where specially allowed under section 131 of the Act.
- 2.1.3 Tenderers shall provide the qualification information statement that the tenderer (including all members of a joint venture and subcontractors) is not associated, or have been associated in the past, directly or indirectly, with a firm or any of its affiliates which have been engaged by the Procuring entity to provide consulting services for the preparation of the design, specifications, and other documents to be used for the procurement of the goods under this Invitation for tenders.
- 2.1.4 Tenderers involved in corrupt or fraudulent practices or debarred from participating in public procurement shall not be eligible.

2.2 Eligible Equipment

- 2.2.1 All equipment to be supplied and installed under the contract shall have their origin in eligible source countries.
- 2.2.2 For purposes of this clause, "origin" means the place where the equipment(s) are produced. Goods are produced when, through manufacturing, processing, or substantial and major assembly of components, a commercially-recognized product results that is substantially different in basic characteristics or in purpose or utility from its components
- 2.2.3 The origin of equipment is distinct from the nationality of the tenderer and shall be treated thus in the evaluation of the tender.

2.3 Cost of Tendering

- 2.3.1 The Tenderer shall bear all costs associated with the preparation and submission of its tender, and the procuring entity, will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.
- 2.3.2 The price to be charged for the tender document shall not exceed Ksh 5000.00
- 2.3.3 The procuring entity shall allow the tenderer to review the tender document free of charge before purchase.

2.4. Contents of Tender Document

- 2.4.1 The tender document comprises the documents listed below and addenda issued in accordance with clause 2.6 of these instructions to tenderers
- (i) Invitation to Tender
 - (ii) Instructions to Tenderers
 - (iii) General Conditions of Contract
 - (iv) Special Conditions of Contract
 - (v) Schedule of requirements
 - (vi) Technical Specifications
 - (vii) Tender Form and Price Schedules
 - (viii) Tender Security Form
 - (ix) Contract Form
 - (x) Performance Security Form
 - (xi) Bank Guarantee for Advance Payment Form
 - (xii) Manufacturer's Authorization Form
 - (xiii) Confidential Business Questionnaire Form
 - (xiv) Declaration form
 - (xv) Request for Review Form
- 2.4.2 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the tender documents. Failure to furnish all information required by the tender documents or to submit a tender not substantially responsive to the tender documents in every respect will be at the tenderers risk and may result in the rejection of its tender.

2.5 Clarification of Tender Documents

- 2.5.1 A prospective tenderer making inquiries of the tender documents may notify the Procuring entity in writing or by post at the entity's address indicated in the invitation for tenders. The Procuring entity will respond in writing to any request for clarification of the tender documents, which it receives not later than seven (7) days prior to the deadline for the submission of tenders, prescribed by the procuring entity. Written copies of the Procuring entities response (including an explanation of the query but without identifying the source of inquiry) will be sent to all prospective tenderers that have received the tender document.
- 2.5.2 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.

2.6 Amendment of Tender Documents

- 2.6.1 At any time prior to the deadline for submission of tender, the procuring entity, for any reason, whether at its own initiative or in response to a clarification requested by a prospective tenderer, may modify the tender documents by issuing an addendum.
- 2.6.2 All prospective tenderers that have obtained the tender documents will be notified of the amendment in writing or by post and will be binding on them.
- 2.6.3 In order to allow prospective tenderers reasonable time in which to take the amendment into account in preparing their tenders, the Procuring entity, at its discretion, may extend the deadline for the submission of tenders.

2.7 Language of Tender

- 2.7.1 The tender prepared by the tenderer, as well as all correspondence and documents relating to the tender exchange by the tenderer and the Procuring entity, shall be written in English language, provided that any printed literature furnished by the tenderer may be written in another language provided they are accompanied by an accurate English translation of the relevant passages in which case, for purposes of interpretation of the tender, the English translation shall govern.

2.8 Documents Comprising the Tender

2.8.1 The tender prepared by the tenderers shall comprise the following components.

- (a) a Tender Form and a Price Schedule completed in accordance with paragraph 2.9, 2.10 and 2.11 below
- (b) documentary evidence established in accordance with paragraph 2.12 that the tenderer is eligible to tender and is qualified to perform the contract if its tender is accepted;
- (c) documentary evidence established in accordance with paragraph 2.13 that the goods and ancillary services to be supplied by the tenderer are eligible goods and services and conform to the tender documents; and
- (d) tender security furnished in accordance with paragraph 2.14
- (e) Confidential Business Questionnaire

2.9 Tender Form

2.9.1 The tenderer shall complete the Form of Tender and the appropriate Price Schedule furnished in the tender documents, indicating the equipment to be supplied, installed and commissioned and a brief description of the equipment, their country of origin, quantity, and prices.

2.10 Tender Prices

2.10.1 The tenderer shall indicate on the appropriate Price Schedule the unit prices where applicable and total tender price of the equipment and installation it proposes to supply under the contract.

2.10.2 Prices indicated on the Price Schedule shall be entered separately in the following manner:

- (i) the price of the equipment quoted EXW (ex works, ex factory, ex warehouse, ex showroom, or off-the-shelf, as applicable), including all customs duties and sales and other taxes already paid or payable;
- (ii) charges for inland transportation, insurance, and other local costs incidental to delivery of the goods to their final destination; and
- (iii) installation charges shall also be indicated separately for each equipment

2.10.3 Prices quoted by the tender shall remain fixed during the Tender's performance of the contract. A tender submitted with an adjustable price

quotation will be treated as non-responsive and will be rejected, pursuant to paragraph 2.22 unless otherwise agreed by the parties.

2.11 Tender Currencies

2.11.1 Prices shall be quoted in the following currencies:

- (a) For equipment that the tenderer will supply from within Kenya, the prices shall be quoted in Kenya Shillings; and
- (b) For equipment that the tenderer will supply from outside Kenya, the prices may be quoted in US Dollars or in another freely convertible currency.
- (c) Cost of installation and commissioning will be in Kenya Shillings.

2.12 Tenderers Eligibility and Qualifications

2.12.1 Pursuant to paragraph 2.1. the tenderers shall furnish, as part of its tender, documents establishing the tenderers eligibility to tender and its qualifications to perform the contract if its tender is accepted.

2.12.2 The documentary evidence of the tenderers eligibility to tender shall establish to the Procuring entity's satisfaction that the tenderer, at the time of submission of its tender, is from an eligible source country as defined under paragraph 2.1

2.12.3 The documentary evidence of the tenderer's qualifications to perform the contract if its tender is accepted shall establish to the Procuring entity's satisfaction;

- (a) that, in the case of a tenderer offering to supply equipment under the contract which the tenderer did not manufacture or otherwise produce, the tenderer has been duly authorized by the equipment, Manufacturer or producer to supply the equipment
- (b) that the tenderer has the financial, technical, and production capability necessary to perform the contract;
- (c) that, in the case of a tenderer not doing business within Kenya, the tenderer is or will be (if awarded the contract) represented by an Agent in Kenya equipped, and able to carry out the Tenderer's maintenance, repair, and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications.

2.13 Goods Eligibility and Conformity to Tender Document

2.13.1 Pursuant paragraph 2.2 of this section, the tenderer shall furnish, as part of its tender documents establishing the eligibility and conformity to the tender documents of all equipment which the tenderer proposes to supply under the contract

2.13.2 The documentary evidence of the eligibility of the goods shall consist of statement in the Price Schedule of the country of origin of the goods and services offered which shall be confirmed by a certificate of origin issued at the time of shipment.

2.13.3 The documentary evidence of conformity of the equipment to the tender documents may be in the form of literature, drawings, and data, and shall consist of:

- a) a detailed description of the essential technical and performance characteristic of the equipment
- b) a list giving full particulars, including available source and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the equipment for a period of two (2) years, following commencement of the use of the equipment by the Procuring entity; and
- c) a clause-by-clause commentary on the Procuring entity's Technical Specifications demonstrating substantial responsiveness of the goods and service to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.

2.13.4 For purposes of the commentary to be furnished pursuant to paragraph 2.13.3(c) above, the tenderer shall note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated by the Procurement entity in its Technical Specifications, are intended to be descriptive only and not restrictive. The tenderer may substitute alternative standards, brand names, and/or catalogue numbers in its tender, provided that it demonstrates to the Procurement entity's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.

2.14 Tender Security

2.14.1 The tenderer shall furnish, as part of its tender, a tender security for the amount and form specified in the Appendix to Instructions to Tenderers.

- 2.14.2 The tender security shall be in the amount not exceeding 2 percent of the tender price.
- 2.14.3 The tender security is required to protect the Procuring entity against the risk of Tenderer's conduct which would warrant the security's forfeiture, pursuant to paragraph 2.14.7
- 2.14.4 The tender security shall be denominated in Kenya Shillings or in another freely convertible currency, and shall be in the form of
- a) Cash
 - b) A bank guarantee
 - c) Such insurance guarantee approved by the Authority
 - d) Letter of credit.
- 2.14.5 Any tender not secured in accordance with paragraph 2.14.1 and 2.14.3 will be rejected by the Procuring entity as non responsive, pursuant to paragraph 2.22
- 2.14.6 Unsuccessful Tenderer's tender security will be discharged or returned as promptly as possible as but not later than thirty (30) days after the expiration of the period of tender validity prescribed by the Procuring entity.
- 2.14.7 The successful Tenderer's tender security will be discharged upon the tenderer signing the contract, pursuant to paragraph 2.27 and furnishing the performance security, pursuant to paragraph 2.28
- 2.14.8 The tender security may be forfeited:
- a) if a tenderer withdraws its tender during the period of tender validity specified by the procuring entity on the Tender Form; or
 - b) in the case of a successful tenderer, if the tenderer fails:
 - i) to sign the contract in accordance with paragraph 2.27
 - or
 - ii) to furnish performance security in accordance with paragraph 2.28
 - c) If the tenderer rejects correction of an arithmetic error in the tender.

2.15 Validity of Tenders

- 2.15.1 Tenderers shall remain valid for 90 days or as specified in the tender documents after date of tender opening prescribed by the Procuring entity, pursuant to paragraph 2.20. A tender valid for a shorter period shall be rejected by the Procuring entity as non responsive.

2.15.2 In exceptional circumstances, the Procuring entity may solicit the Tenderer's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing. The tender security provided under paragraph 2.14 shall also be suitably extended. A tenderer may refuse the request without forfeiting its tender security. A tenderer granting the request will not be required nor permitted to modify its tender.

2.16 Format and Signing of Tender

2.16.1 The Procuring entity shall prepare two copies of the tender, clearly marking each "ORIGINAL TENDER" and "COPY OF TENDER," as appropriate. In the event of any discrepancy between them, the original shall govern.

2.16.2 The original and all copies of the tender shall be typed or written in indelible ink and shall be signed by the tenderer or a person or persons duly authorized to bind the tenderer to the contract. All pages of the tender, except for unamended printed literature, shall be initialed by the person or persons signing the tender.

2.16.3 The tender shall have no interlineations, erasures, or overwriting except as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person or persons signing the tender.

2.17 Sealing and Marking of Tenders

2.17.1 The Tenderer shall seal the original and each copy of the tender in separate envelopes, duly marking the envelopes as "ORIGINAL" and "COPY." The envelopes shall then be sealed in an outer envelope.

2.17.2 The inner and outer envelopes shall:

(a) be addressed to the Procuring entity at the address given on the Invitation to Tender.

(b) bear the tender number and name in the Invitation to Tender and the words "DO NOT OPEN BEFORE **August 19, 2015 at 10am**"

2.17.3 The inner envelopes shall also indicate the name and address of the tenderer to enable the tender to be returned unopened in case it is declared "late".

2.17.4 If the outer envelope is not sealed and marked as required by paragraph 2.17.2, the Procuring entity will assume no responsibility for the tender's misplacement or premature opening.

2.18 Deadline for Submission of Tenders

2.18.1 Tenders must be received by the Procuring entity at the address specified under paragraph 2.17.2 not later than **August 19, 2015 at 10am**.

2.18.2 The Procuring entity may, at its discretion, extend this deadline for the submission of tenders by amending the tender documents in accordance with paragraph 2.6, in which case all rights and obligations of the Procuring entity and candidates previously subject to the deadline will therefore be subject to the deadline as extended

2.18.3 Bulky tenders which will not fit in the tender box shall be received by the procuring entity as provided for in the Appendix.

2.19 Modification and Withdrawal of Tenders

2.19.1 The tenderer may modify or withdraw its tender after the tender's submission, provided that written notice of the modification, including substitution or withdrawal of the tenders, is received by the Procuring entity prior to the deadline prescribed for submission of tenders.

2.19.2 The Tenderer's modification or withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of paragraph 2.17. A withdrawal notice may also be sent by cable, telex but followed by a signed confirmation copy, postmarked not later than the deadline for submission of tenders.

2.19.3 No tender may be modified after the deadline for submission of tenders.

2.19.4 No tender may be withdrawn in the interval between the deadline for submission of tenders and the expiration of the period of tender validity specified by the tenderer on the Tender Form. Withdrawal of a tender during this interval may result in the Tenderer's forfeiture of its tender security, pursuant to paragraph 2.14.7

2.20 Opening of Tenders

2.20.1 The Procuring entity will open all tenders in the presence of tenderers' representatives who choose to attend, at **August 19, 2015 at 10am** and in the following location.

Kenya Agriculture & Livestock Research Organization, off Kangemi, along Kaptagat Road, Loresho, Nairobi, Kenya

The tenderers' representatives who are present shall sign a tender opening register evidencing their attendance.

2.20.2 The tenderers' names, tender modifications or withdrawals, tender prices, discounts and the presence or absence of requisite tender security and such other details as the Procuring entity, at its discretion, may consider appropriate, will be announced at the opening.

2.20.3 The Procuring entity will prepare minutes of the tender opening.

2.21 Clarification of Tenders

2.21.1 To assist in the examination, evaluation and comparison of tenders the Procuring entity may, at its discretion, ask the tenderer for a clarification of its tender. The request for clarification and the response shall be in writing, and no change in the prices or substance of the tender shall be sought, offered, or permitted.

2.21.2 Any effort by the tenderer to influence the Procuring entity in the Procuring entity's tender evaluation, tender comparison or contract award decisions may result in the rejection of the tenderers' tender.

2.22 Preliminary Examination and Responsiveness

2.22.1 The Procuring entity will examine the tenders to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the tenders are generally in order.

2.22.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected. If the candidate does not accept the correction of the errors, its tender will be rejected, and its tender security may be

forfeited. If there is a discrepancy between words and figures the amount in words will prevail

2.22.3 The Procuring entity may waive any minor informality or non-conformity or irregularity in a tender which does not constitute a material deviation, provided such waiver does not prejudice or effect the relative ranking of any tenderer.

2.22.4 Prior to the detailed evaluation, pursuant to paragraph 2.23 the Procuring entity will determine the substantial responsiveness of each tender to the tender documents. For purposes of these paragraphs, a substantially responsive tender is one, which conforms to all the terms and conditions of the tender documents without material deviations. The Procuring entity's determination of a tender's responsiveness is to be based on the contents of the tender itself without recourse to extrinsic evidence.

2.22.5 If a tender is not substantially responsive, it will be rejected by the Procuring entity and may not subsequently be made responsive by the tenderer by correction of the non conformity.

2.23 Conversion to Single Currency

2.23.1 Where other currencies are used, the Procuring Entity will convert those currencies to Kenya Shillings using the selling exchange rate on the date of tender closing provided by the Central Bank of Kenya.

2.24 Evaluation and Comparison of Tenders

2.24.1 The Procuring entity will evaluate and compare the tenders which have been determined to be substantially responsive, pursuant to paragraph 2.22

2.24.2 The Procuring entity's evaluation of a tender will exclude and not take into account

- (a) in the case of equipment manufactured in Kenya or equipment of foreign origin already located in Kenya, sales and other similar taxes, which will be payable on the goods if a contract is awarded to the tenderer; and
- (b) any allowance for price adjustment during the period of execution of the contract, if provided in the tender.

2.24.3 The comparison shall be of the ex-factory/ex-warehouse/off-the-shelf price of the goods offered from within Kenya, such price to include all costs, as

well as duties and taxes paid or payable on components and raw material incorporated or to be incorporated in the goods.

2.24.4 The Procuring entity's evaluation of a tender will take into account, in addition to the tender price and the price of incidental services, the following factors, in the manner and to the extent indicated in paragraph 2.23.5 and in the technical specifications:

- (a) delivery and installation schedule offered in the tender;
- (b) deviations in payment schedule from the specifications in the Special Conditions of Contract;
- (c) the cost of components, mandatory spare parts and service;
- (d) the availability in Kenya of spare parts and after-sales service for the equipment offered in the tender;

2.24.5 Pursuant to paragraph 2.24.4 the following evaluation methods will be applied

(a) *Delivery schedule*

- (i) The Procuring entity requires that the equipment under the Invitation for Tenders shall be delivered at the time specified in the Schedule of Requirements. Tenders offering deliveries longer than the procuring entity's required delivery time will be treated as non-responsive and rejected.

(b) *Deviation in payment schedule*

Tenderers shall state their tender price for the payment of schedule outlined in the special conditions of contract. Tenders will be evaluated on the basis of this base price. Tenderers are, however, permitted to state an alternative payment schedule and indicate the reduction in tender price they wish to offer for such alternative payment schedule. The Procuring entity may consider the alternative payment schedule offered by the selected tenderer.

(c) *Spare parts and after sales service facilities*

Tenderers must offer items with service and spare parts back-up. Documentary evidence and locations of such back-up must be given. Where a tenderer offers items without such back-up in the country, he must give a documentary evidence and assurance that he will establish adequate back-up for items supplied.

2.24.6 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.

2.24.7 Preference where allowed in the evaluation of tenders shall not exceed 15%

2.25 Contacting the Procuring Entity

2.25.1 Subject to paragraph 2.21 no tenderer shall contact the Procuring entity on any matter related to its tender, from the time of the tender opening to the time the contract is awarded.

2.25.2 Any effort by a tenderer to influence the Procuring entity in its decisions on tender, evaluation, tender comparison, or contract award may result in the rejection of the Tenderer's tender.

2.26 Award of Contract

(a) Post-Qualification

2.26.1 In the absence of pre-qualification, the Procuring entity will determine to its satisfaction whether the tenderer that is selected as having submitted the lowest evaluated responsive tender is qualified to perform the contract satisfactorily.

2.26.2 The determination will take into account the tenderer financial, technical, and production capabilities. It will be based upon an examination of the documentary evidence of the tenderers qualifications submitted by the tenderer, pursuant to paragraph 2.12.3 as well as such other information as the Procuring entity deems necessary and appropriate.

2.26.3 An affirmative determination will be a prerequisite for award of the contract to the tenderer. A negative determination will result in rejection of the Tenderer's tender, in which event the Procuring entity will proceed to the next lowest evaluated tender to make a similar determination of that Tenderer's capabilities to perform satisfactorily.

(b) Award Criteria

2.26.4 The Procuring entity will award the contract to the successful tenderer(s) whose tender has been determined to be substantially responsive and has been determined to be the lowest evaluated tender, provided further that the tenderer is determined to be qualified to perform the contract satisfactorily.

2.26.5 To qualify for contract awards, the tenderer shall have the following:

- a) Necessary qualifications, capability experience, services, equipment and facilities to provide what is being procured.
- b) Legal capacity to enter into a contract for procurement
- c) Shall not be insolvent, in receivership, bankrupt or in the process of being wound up and is not the subject of legal proceedings relating to the foregoing.
- d) Shall not be debarred from participating in public procurement.

(c) Procuring Entity's Right to Accept or Reject Any or All Tenders

2.26.6 The Procuring entity reserves the right to accept or reject any tender, and to annul the tendering process and reject all tenders at any time prior to contract award, without thereby incurring any liability to the affected tenderer or tenderer of the grounds for the procuring entity's action

2.26.7 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination

2.26.8 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.

2.26.9 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.

2.27 Notification of Award

2.27.1 Prior to the expiration of the period of tender validity, the Procuring entity will notify the successful tenderer in writing that its tender has been accepted.

2.27.2 The notification of award will signify the formation of the Contract but will have to wait until the contract is finally signed by both parties. Simultaneous other tenderers shall be notified that their tenders have not been successful.

2.27.3 Upon the successful Tenderer's furnishing of the performance security pursuant to paragraph 2.29, the Procuring entity will simultaneously inform the other tenderers that their tenders have not been successful

2.28 Signing of Contract

2.28.1 At the same time as the Procuring entity notifies the successful tenderer that its tender has been accepted, the procuring entity will simultaneously inform the other tenderers that their tenders have not been successful.

2.28.2 Within fourteen (14) days of receipt of the Contract Form, the successful tenderer shall sign and date the contract and return it to the Procuring entity.

2.28.3 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.

2.28.4 Performance Security

2.28.5 Within Thirty (30) days of the receipt of notification of award from the Procuring entity, the successful tenderer shall furnish the performance security in accordance with the Conditions of Contract, in the Performance Security Form provided in the tender documents, or in another form acceptable to the Procuring entity.

2.28.6 Failure of the successful tenderer to comply with the requirements of paragraph 2.28 or paragraph 2.29 shall constitute sufficient grounds for the annulment of the award and forfeiture of the tender security, in which event the Procuring entity may make the award to the next lowest evaluated Candidate or call for new tenders.

2.29 Corrupt or Fraudulent Practices

2.29.1 The procuring entity requires that tenderers observe the highest standard of ethics during the procurement process and execution of contracts. A tenderer shall sign a declaration that he has and will not be involved in corrupt or fraudulent practices.

3.30.2 The Procuring entity will reject a proposal for award if it determines that the tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

3.30.3 Further a tenderer who is found to have indulged in corrupt or fraudulent practices risks being debarred from participating in public Procurement in Kenya.

2.30 APPENDIX TO INSTRUCTIONS TO TENDERERS

The following information regarding the particulars of the tender shall complement, supplement or amend the provisions of the instructions to tenderers. Wherever there is a conflict between the provision of the instructions to tenderers and the provisions of the appendix, the provisions of the appendix herein shall prevail over those of the instructions to tenderers.

ITT REF;	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
2.1.1	<p>Mandatory requirements;</p> <ol style="list-style-type: none"> 1. Copy of Certificate of Incorporation/ Registration details certified by a Notary Public or Advocate 2. Copy of Tax compliance certificate 3. Litigation history 4. Audited accounts for last three (3) years 5. Atleast three(3) written references for similar assignments successfully carried out in last five years 6. Company profile for the tenderer 7. Qualification of key personnel of the tenderer 8. Single Business permit or statement of principal place of business 9. Duly filled in, signed and rubberstamped Confidential Business Questionnaire 10. Duly filled, signed and rubberstamped Bidder Declaration and Integrity Pact 11. Manufacturer authorization <p>NB; Any tenderer who does not submit any of the above requirements shall be considered non-responsive and shall NOT be allowed into the next stage of evaluation</p>
2.3.2	<p>Cost of tender; Kenya Shillings 1,000.00 or United States dollar eleven (US \$11)</p>
2.10.2	<p>Tender Price; The tender price shall be inclusive all supply, installation, training and commissioning of equipment, CIF KALRO, Tea Research Institute Kericho, Kenya</p>
2.14.1	<p>Tender Security; Tender security shall be 2% of the bid price submitted in form of Bank guarantee from a reputable bank licensed and operating in Kenya or a reputable International bank with a branch in Kenya and recognized by Central Bank of Kenya</p>
2.15.1	<p>Tender validity period; The tender price shall be valid for 120 days after closing date of tender</p>

2.17.2	<p>The tender document to be deposited in the tender box at the reception are of KALRO Headquarters in Loresho, along Kaptagat road, off Kangemi Fly Over or be addressed to;</p> <p>Director General Kenya Agriculture & Livestock Research Organization P O Box Nairobi Att; Supply Chain Manager</p> <p>So as to reach on or before August 19, 2015 at 10am East African time. The tender shall be opened immediately in the presence of tenderer representative who choose to attend.</p> <p>Att; S O Musewe Mobile; 0722293365, email; stevens.musewe@kalro.org</p>
2.18.3	<p>Bulky tender documents that cannot fit into the tender box shall be received by Ms W. Nyangweso at KALRO Headquarters room 149</p>
2.23	<p>The bid currency shall be in Kenya Shillings or United States Dollar. The dollar conversion shall be according to the rates determined by the Central Bank of Kenya for the date of closing tender</p>
2.24.5	<p>The Technical evaluation stage shall consider;</p> <ol style="list-style-type: none"> a. Conformity to specifications b. Delivery schedule c. Payment schedule d. Documentary evidence of local availability of spare part of the equipment in Kenya and name of the local agent for after sale backup
2.28.4	<p>Performance security will be equivalent to the amount demanded by the tenderer as advance payment in form of Bank guarantee from a reputable bank licensed and operating in Kenya or International bank with branch in Kenya recognized by the Central Bank of Kenya</p>

SECTION III: GENERAL CONDITIONS OF CONTRACT

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SECTION III - GENERAL CONDITIONS OF CONTRACT

3.1 Definitions

3.1.1 In this Contract, the following terms shall be interpreted as indicated:-

- (a) “The Contract” means the agreement entered into between the Procuring entity and the tenderer, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- (b) “The Contract Price” means the price payable to the tenderer under the Contract for the full and proper performance of its contractual obligations
- (c) “The Goods” means all of the equipment, machinery, and/or other materials, which the tenderer is required to supply to the Procuring entity under the Contract.
- (d) “The Procuring entity” means the organization purchasing the Goods under this Contract.
- (e) “The Tenderer” means the individual or firm supplying the Goods under this Contract.

3.2 Application

3.2.1 These General Conditions shall apply in all Contracts made by the Procuring entity for the procurement installation and commissioning of equipment to the extent that they are not superceded by provisions of other part of contract.

3.3 Country of Origin

3.3.1 For purposes of this clause, “Origin” means the place where the Goods were mined, grown or produced.

3.3.2 The origin of Goods and Services is distinct from the nationality of the tenderer and will be treated thus in the evaluation of the tender.

3.4 Standards

3.4.1 The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications.

3.5 Use of Contract Documents and Information

3.5.1 The Candidate shall not, without the Procuring entity's prior written consent, disclose the Contract, or any provision therefore, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Procuring entity in connection therewith, to any person other than a person employed by the tenderer in the performance of the Contract.

3.5.2 The tenderer shall not, without the Procuring entity's prior written consent, make use of any document or information enumerated in paragraph 3.5.1 above

3.5.3 Any document, other than the Contract itself, enumerated in paragraph 3.5.1 shall remain the property of the Procuring entity and shall be returned (all copies) to the Procuring entity on completion of the Tenderer's performance under the Contract if so required by the Procuring entity

3.6 Patent Rights

3.6.1 The tenderer shall indemnify the Procuring entity against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof in the Procuring entity's country

3.7 Performance Security

3.7.1 Within twenty eight (28) days of receipt of the notification of Contract award, the successful tenderer shall furnish to the Procuring entity the performance security where applicable in the amount specified in Special Conditions of Contract.

3.7.2 The proceeds of the performance security shall be payable to the Procuring entity as compensation for any loss resulting from the Tenderer's failure to complete its obligations under the Contract.

3.7.3 The performance security shall be denominated in the currency of the contract, or in a freely convertible currency acceptable to the procuring entity and shall be in the form of

- a) Cash
- b) Bank guarantee
- c) Such insurance guarantee approved by the Authority
- d) Letter of credit

3.7.4 The performance security will be discharged by the Procuring entity and returned to the Candidate not late than thirty (30) days following the date of completion of the Tenderer's performance obligations under the Contract, including any warranty obligations, under the Contract

3.8 Inspection and Tests

3.8.1 The Procuring entity or its representative shall have the right to inspect and/or to test the equipment to confirm their conformity to the Contract specifications. The Procuring entity shall notify the tenderer in writing in a timely manner, of the identity of any representatives retained for these purposes.

3.8.2 The inspections and tests may be conducted in the premises of the tenderer. All reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Procuring entity.

3.8.3 Should any inspected or tested equipment fail to conform to the Specifications, the Procuring entity may reject the equipment, and the tenderer shall either replace the rejected equipment or make alterations necessary to make specification requirements free of costs to the Procuring entity.

3.8.4 The Procuring entity's right to inspect test and where necessary, reject the equipment after the equipment arrival and installation shall in no way be limited or waived by reason of the equipment having previously been inspected, tested and passed by the Procuring entity or its representative prior to the equipment delivery.

3.8.5 Nothing in paragraph 3.8 shall in any way release the tenderer from any warranty or other obligations under this Contract.

3.9 Packing

3.9.1 The tenderer shall provide such packing and packaging of the equipment as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract.

3.9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract

3.10 Delivery and Documents

3.10.1 Delivery of the equipment, documents and installation of the same shall be made by the tenderer in accordance with the terms specified by Procuring entity in its Schedule of Requirements and the Special Conditions of Contract

3.11 Insurance

3.11.1 The equipment supplied under the Contract shall be fully insured against loss or damage incidental to manufacturer or acquisition, transportation, storage, and delivery in the manner specified in the Special conditions of contract.

3.12 Payment

3.12.1 The method and conditions of payment to be made to the tenderer under this Contract shall be specified in Special Conditions of Contract

3.12.2 Payments shall be made promptly by the Procuring entity as specified in the contract

3.13 Prices

3.13.1 Prices charged by the tenderer for equipment delivered and installation performed under the Contract shall not, with the exception of any price adjustments authorized in Special Conditions of Contract, vary from the prices by the tenderer in its tender.

3.13.2 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)

3.13.3 Where contract price variation is allowed, the variation shall not exceed 10% of the original contract price.

3.13.4 Price variation requests shall be processed by the procuring entity within 30 days of receiving the request.

3.14. Assignment

The tenderer shall not assign, in whole or in part, its obligations to perform under this Contract, except with the Procuring entity's prior written consent

3.15. Subcontracts

3.15.1 The tenderer shall notify the Procuring entity in writing of all subcontracts awarded under this Contract if not already specified in the tender. Such notification, in the original tender or later, shall not relieve the tenderer from any liability or obligation under the Contract

3.16. Termination for Default

3.16.1 The Procuring entity may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the tenderer, terminate this Contract in whole or in part

- (a) if the tenderer fails to deliver any or all of the equipment within the period(s) specified in the Contract, or within any extension thereof granted by the Procuring entity
- (b) if the tenderer fails to perform any other obligation(s) under the Contract
- (c) if the tenderer, in the judgment of the Procuring entity has engaged in corrupt or fraudulent practices in competing for or in executing the Contract

3.16.2 In the event the Procuring entity terminates the Contract in whole or in part, it may procure, upon such terms and in such manner as it deems appropriate, equipment similar to those undelivered, and the tenderer shall be liable to the Procuring entity for any excess costs for such similar equipment.

3.17. Termination for convenience

3.18. Liquidated Damages

3.18.1 If the tenderer fails to deliver and/or install any or all of the items within the period(s) specified in the contract, the procuring entity shall, without prejudice to its other remedies under the contract, deduct from the contract prices liquidated damages sum equivalent to 0.5% of the delivered price of the delayed items up to a maximum deduction of 10% of the delayed goods. After this the tenderer may consider termination of the contract.

3.19. Resolution of Disputes

3.19.1 The procuring entity and the tenderer shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the contract

3.19.2 If, after thirty (30) days from the commencement of such informal negotiations both parties have been unable to resolve amicably a contract dispute, either party may require that the dispute be referred for resolution to the formal mechanisms specified in the SCC.

3.20. Language and Law

3.20.1 The language of the contract and the law governing the contract shall be English language and the Laws of Kenya respectively unless otherwise specified in the SCC

3.21. Force Majeure

3.21.1 The Tenderer shall not be liable for forfeiture of its performance security or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

3.22 Notices

3.22.1 Any notice given by one party to the other pursuant to this contract shall be sent to other party by post or by fax or Email and confirmed in writing to the other party's address specified.

3.22.2 A notice shall be effective when delivered or on the notices effective date, whichever is later.

SECTION IV - SPECIAL CONDITIONS OF CONTRACT

- 4.1 Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, between the GCC and the SCC, the provisions of the SCC herein shall prevail over these in the GCC.
- 4.2 Special conditions of contract as relates to the GCC

REFERENCE OF GCC	SPECIAL CONDITIONS OF CONTRACT
3.7.1	Performance Security shall be in form Banker guarantee, from a reputable Bank in Kenya or with reputable International bank with branch in Kenya or Irrevocable Letter of Credit
3.12.1	Payment terms shall be as follows: - e. 50% of total price on safe delivery of equipment on site f. 40% on Installation, Training, successful commissioning of equipment and submission of Engineers report g. 10% retention fee 6 months after successful commissioning
3.18.1	Resolution of disputes shall be through arbitration, using Kenya Charter of Arbitration

SECTION - V- SCHEDULE OF REQUIREMENTS AND PRICES

Notes on Schedule of Requirements and Prices

- 5.1 The Procuring entity must state whether the contract is for procurement, installation and commissioning OR whether it is for installation and commissioning only, in which case, the equipment will have been procured separately.

- 5.2 The tenderers may use additional paper as will be necessary to indicate the details of their costing.

SECTION V - SCHEDULE OF REQUIREMENTS AND PRICES

**Tender for; SUPPLY, INSTALLATION, TRAINING & COMISSIONING OF
MACHINERY AND EQUIPMENT FOR THE PROPOSED
TEA RESEARCH AND DEVELOPMENT FACTORY AT KALRO, TEA RESARCH
INSTITUTE IN KERICHO, KENYA
(PHASE ONE)**

Tender No; KALRO/TRI/INT TENDER/01/ 2015-16

LOT No.	LOT Description	Total Cost of LOT (Kshs)	Installation Period (weeks)	Training Period (weeks)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
	TOTAL			

Authorized Official: _____
Name

Signature

Date

SECTION VI - TECHNICAL SPECIFICATIONS

6.1 GENERAL

- 6.1.1. These specifications describe the basic requirements for equipment. Tenderers are requested to submit with their offers the detailed specifications, drawings, catalogues, etc for the products they intend to supply.
- 6.1.2 Tenderers must indicate on the specifications sheets whether the equipment offered comply with each specific requirement.
- 6.1.3 All the dimensions and capacities of the equipment to be supplied shall not be less than those required in these specifications. Deviations from the basic requirements, if any, shall be explained in detail in writing with the offer, with supporting data such as calculation sheets, etc. The procuring entity reserves the right to reject the products, if such deviations shall be found critical to the use and operation of the products
- 6.1.4 The tenderers are requested to present information along with their offers as follows;-
- (i) Shortest possible delivery period of each product
 - (ii) Information on proper representative and/or workshop for back-up service/repair and maintenance including their names and addresses

SECTION VI – TECHNICAL SPECIFICATIONS

6.2 PARTICULARS

HEALTH AND SAFETY REQUIREMENTS

6.2.1 GENERAL

All moving machinery parts to be securely guarded by use of fixed or interlocking guards or other suitable devices subject to our approval.

All machinery parts and accessories should be properly constructed to eliminate or minimise vibrations and/or noise while in operation.

Fans and humidifiers should be rigidly mounted on anti-vibration pads where necessary.

Avoid use of **Mercury** and/or **Alcohol** in the instruments or any other parts of the machines.

Any lagging and gaskets materials used shall be free of **Asbestos (zero asbestos content)**

6.2.2 GUARDING

Guarding must be provided by the supplier to meet the requirements of the **Health and Safety at Work Act**, latest edition.

The equipment and its guarding must comply with BS5304 (latest edition).

All opening guard doors must be interlocked. The interlocks shall be subject to approval by TRFK Engineers.

When a guard is opened, all moving parts must stop before access can be gained. Closing a guard must not reactivate machine. The machine must be restarted by a **Positive Operator Action (POA)**.

All switches and wiring must 'fail safe', i.e. switches normally closed when guards are closed.

The underside of conveyors must be guarded where hazards exist **without** creating a food hygiene risk.

All fixed guarding **MUST** be secured by fixings/fasteners requiring tools to remove.

All guards shall made from 1.5mm SS Perforated Sheet and the guards shall not be painted.

6.2.3 ELECTRICAL SYSTEMS

All electrical engineering components and practices to comply with current IEE Regulations; The Electricity at Work Regulations latest edition.

All electrical equipment must have the strength and capability for the application and the appropriate rating.

All wiring and control cabinet components must be identified (numerically or alphabetically) according to terminal block designations and electrical circuit drawings.

No more than two wires (except for motor starter/relay suppression components) to be connected to any one terminal (connector).

Panel isolators must be interlocked with the control panel door and have a facility for being padlocked in the off position. The control panel incoming isolator should isolate (break) all incoming supplies (power and signals).

All incoming cables to control panels must be shrouded and identified to prevent accidental contact, i.e. warning live terminals.

Emergency stop buttons must be fitted adjacent to **main** moving equipment where the equipment is remote operated (distance in excess of 5Meters from the control panel).

Emergency stops and interlocked guard control circuits should be hard wired. They must not be routed through a plc.

All individual drive motors to have an independent on load isolator capable of being padlocked in the off position.

Circuit and layout drawings/diagrams are to be provided, together with design calculations for cable loadings, fault conditions, protective devices, ratings etc. All designs and corresponding drawings must be approved before manufacture commences.

6.2.4 NOISE AND VIBRATION

Noise level must not exceed 70dBA at one metre from source.

Noise data should be supplied for each machine.

Equipment, which is likely to expose any person to vibration, must be identified and vibration levels provided.

SECTION VI – TECHNICAL SPECIFICATIONS

6.3 BILLS OF QUANTITIES

LOT 1- MONORAIL

		Training requirements after commissioning				2 weeks	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
1	Overhead chain Conveyor-Monorail						
A	Monorail straight trucking 800ft			Ft	800		
B	Monorail chain –800ft			Ft	800		
C	Monorail drive unit –c/w Motor, sprockets, speed reduction unit, chain etc. and control panel,			Unit	1		
D	Tensioning unit			Unit	1		
E	vertical bend – 30 degrees			Unit	20		
F	vertical bends- 60 degree			Unit	20		
G	horizontal bends 90 degree			Unit	20		
F	M/S hooks dia. 13mm			Unit	600		
H	Monorail support brackets for installation of 1400ft monorail			Lot			
I	Labour, consumable, accommodation for installation of item 1A to 1H			Lot			
Total cost of LOT 1 <i>(carried to tender form)</i>							

LOT 2- WITHERING TROUGHS

Training requirements after commissioning						1 week	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
2.1	Withering Trough 88ft long, C/W side panels, rear and front panels, Trough bend and green mesh			Unit	5		
2.2	Steam to air heat radiators 74 ½” wide X 26 ½” high as specified			Unit	5		
2.3	Transitional piece Suitable for 48” fan casing			Unit	5		
2.4	Withering trough axial fans with rotor diameter of 48” c/w fan motor, fan casing, guard and base for motor mounting.			Unit	5		
	- Fan performance curve						
	- Submittal Data Sheet						
Total cost of LOT 2 <i>(carried to tender form)</i>							

LOT 3- CONTINUOUS WITHERING-CCW/CPW

Training requirements after commissioning						1 month	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
3	Continuous withering machine comprising of 2 Nos CCW @15000KG capacity and 1 No CPW						
	- Electrical field wiring						
	- Feeding conveyors						
	- Technical specifications						
Total cost of LOT 3 <i>(carried to tender form)</i>							

LOT 4- WEIGH FEEDER AND WEIGHING SCALE

Training requirements after commissioning						2 weeks	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
4	Weigh Feeder 6000kg/hr			Unit	1		
	- Operational requirements						
	- Output information display						
	- Warranty & references						
	- Maintenance manual						
	- Support & expansions						
5	Electronic Weighing Scales						
5.1	150kg Electronic Weighing scale – Sorting scale as specified in 3 c/w AVS Switch as <i>Solatek</i> or equivalent.			No	1		
5.2	200kg Electronic weighing scale – Packing scale as specified in 2 c/w AVS Switch as <i>Solatek</i> or equivalent			No	2		
5.3	500kg Electronic weighing scale – green leaf receipt scale as specified in 1 c/w AVS Switch as <i>Solatek</i> or equivalent			No	2		
5.4	3000kg Electronic weighing scale – Palletized tea dispatch scale as specified in 4 c/w AVS Switch as <i>Solatek</i> or equivalent.			No	1		
Total cost of LOT 4 (carried to tender form)							

LOT 5- CUTTING FERMENTATION AND DRYING

		Training requirements after commissioning					1 month
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
6	Rotor Vane 450mm -			Unit	1		
	- Recommended spare parts						
7	Triplex CTC Machine 42” Wide C& F Mombasa and inclusive of installation charges			Unit	1		
	- Initial spares stock						
	- Wiring & manuals						
8	Automated Continuous fermenting machine (CFM)- 3000kg/hr			Unit	1		
	- Instrumentation as described						
	- Drawing & manuals						
9	VFBD dryer or Fluid bed dryer with cyclones-capacity 600kg/hr-			Unit	1		
	State TYPE 1 or TYPE 2						
	- Temperature recorders						
	- Tech Data Sheet						
9a	Dryer automation as per bidders technical offer			Unit	1		
	- Dryer feed & tempo controls						
	- Air flow controls						
Total cost of LOT 5 <i>(carried to tender form)</i>							

LOT 6 - SORTING

Training requirements after commissioning						2 weeks	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
10	Pre-sorter with fibre extraction rollers 48" wide c/w tea retaining hopper- 600kg/hr			Unit	3		
	- Technical Data sheet						
11	Vibro-screen sorters-final sorters			Unit	4		
	- Technical Data sheet						
Total cost of LOT 6 <i>(carried to tender form)</i>							

LOT 7- WINNOWING AND BULKING BINS

Training requirements after commissioning						1 week	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
12 & 13	Winnowing machine c/w cotton canvas belt conveyor and tea retaining hopper			Unit	1		
14	Bulking bins made from 1.5mm SS 304. Complete with cat ladder and walkway over the bins			Unit	10		
15	Vertical Bucket elevator for bin feed			Unit	1		
16	Cotton canvas conveyor for bin discharge 24" wide X 27.5M long			Unit	1		
	- Magnets top covers etc						
Total cost of LOT 7 <i>(carried to tender form)</i>							

LOT 8- TEA PACKER AND ACCESSORIES

		Training requirements after commissioning				2 weeks	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
17	Tea packer c/w forming box			Unit	2		
18	Cotton canvas conveyor for packer feed 18" wide x 6m long			Unit	1		
	- Magnets top covers etc						
19	Tea packer retaining hopper			Unit	1		
20	Roller conveyor 460mm wide x 918mm long for packaged teas			Unit	2		
Total cost of LOT 8 <i>(carried to tender form)</i>							

LOT 9- LIFTING EQUIPMENTS

		Training requirements after commissioning				1 week	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
21	Hydraulic lifting platform – 3000kgs capacity			Unit	1		
	- Detailed product brochures						
31	Manual pallet truck 3000kg			Unit	1		
	- Detailed product brochures						
32	Hydraulic workshop hoist – 3000kg			Unit	1		
Total cost of LOT 9 <i>(carried to tender form)</i>							

LOT 10- BOILER

Training requirements after commissioning						1 month	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
22	Dual fired steam boiler 8000kg/hr on furnace oil and 4545kg/hr on wood			Unit	1		
	- Water level controls & alarm						
	- Pressure switches & gauges						
	- Tools and spares						
	- Technical data sheet						
- Extra information on pg 123							
Total cost of LOT 10 <i>(carried to tender form)</i>							

LOT 11 - GENERATOR

Training requirements after commissioning						1 week	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
23	640KVA Diesel driven generator including two service			Unit	1		
	- 2no 12V HD batteries						
	- Instrument control panel						
	- Trickle charger						
Total cost of LOT 11 <i>(carried to tender form)</i>							

LOT 12- HOLDING TANKS

Training requirements after commissioning						1 day	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
24	Furnace oil storage tank 120,000 litres C/W pump, heater battery and associated piping			Unit	1		
25	Furnace Fuel service tank 7500 litres c/w heater and associated piping			Unit	2		
26	Condensate holding and boiler service tank-7500 litres			Unit	2		
Total cost of LOT 12 <i>(carried to tender form)</i>							

LOT 13 - WORKSHOP MACHINERIES

Training requirements after commissioning						1 month	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
27	Wheeled trolley			Unit	1		
28	CTC (non CNC) roller grooving lathe c/w attachments			Unit	1		
	Machining/maintenance tools						
	- Spares for two (2) years						
29	CTC roller inspection bench			Unit	1		
30	CTC Milling cutter and chaser grinder			Unit	1		
33	Multi -purpose lathe machine			Unit	1		
	Lathe attachments						
34	Workshop bench			Unit	1		
35	Welding bench			Unit	1		
Total cost of LOT 13 <i>(carried to tender form)</i>							

LOT 14- DIESEL TANK AND DISPENSER

Training requirements after commissioning						1 day	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
36	Supply and install underground diesel holding tank-15,000 litres			unit	1		
	All fittings and accessories						
37	Supply and install 50l/m fuel dispenser on the above tank as Wayne dresser, Tokheim or equal and approved			unit	1		
	Digital calibrated flow meter						
	All pipe work and fittings						
Total cost of LOT 14 <i>(carried to tender form)</i>							

LOT 15 - WATER TREATMENT PLANTS

Training requirements after commissioning						1 week	
Item	Description	Requirement included?		Unit	Qty	Unit cost	Total cost
		Yes	No				
38	Pre- Boiler water treatment plant			unit	1		
	Full scope of supply						
	System controls						
	Schematics & brochure						
39	Portable water treatment plant			unit	1		
	Full scope of supply						
	System controls						
	Schematics & brochure						
Total cost of LOT 15 <i>(carried to tender form)</i>							

TOTAL DELIVERED TO KALRO, TEA RESEARCH INSTITUTE FACTORY		
DAYS TO DELIVER AND INSTALL		
TENDER VALIDITY		
<p>We certify that our above prices are inclusive of cost (CIF where applicable), sales tax, duty, all government levies, labor, transportation to site, insurance in transit, loading on trucks at our works and off-loading and safe delivery of machines and items at site of the tea factory. Also included in our prices are all motors, nuts, bolts, washers, gaskets and like items, foundation bolts and accessories required for assembly, erection and fixing of machines on site and commissioning.</p>		

SECTION VI – TECHNICAL SPECIFICATIONS

6.4 DETAILED SPECIFICATIONS

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1. SPECIFICATIONS FOR OVERHEAD CHAIN CONVEYOR

The overhead chain conveyor should consist of the following: -

Trunk Length

This shall be the closed/open type, smooth - finished, levelled and aligned. To be supplied in standard lengths of 10ft. Manufactured from Hot Rolled Low Carbon Steel of 4.0mm minimum thickness.

Vertical and Horizontal Bends

The horizontal bends are 90 degrees while the vertical bends should include 30 degrees and 45 degrees. These shall be made of hardened steel. **The standard turn radius shall not exceed 610mm with both the horizontal and vertical rollers pitches set at most 305 mm long.**

Colour Finish

The final colour finish will be Tangle orange on all trucking.

The Chain

This shall consist of chain trolleys with four (4 nos.) 51 mm (2") diameter hardened steel rollers moving in between the runner's vertical sides. Solid steel shackles shall carry a load of not less than 25 kgs.

Chain pitch

The chain pitch should not be more than 12".

The Hook

The hook shall be made from **hardened steel rod** and be properly curved so as to leave at least 152 mm (6") stem and to have load carrying capacity of at least 25 kgs. The hook diameter shall be **13mm (Minimum)**.

Drive Unit

Shall be a variable speed drive, 3 phases, 50 Hz motor with a reduction gearbox of a suitable ratio to give an effective chain speed of between 0 - 25 m/min **It shall have a mechanical shear pin overload protection device.** The drive unit shall be complete with a suitable control gear and motor protection.

Tensioner Unit

A suitable 24" radius spring-loaded tension unit shall be provided or equal and approved by Kenya Tea Development Agency.

Lubricator

The lubricator shall be automatic spray type lubricator. It shall have sturdy dispensing tubes to resist vibrations and designed in such a way that it will lubricate the chain pins and rollers (bearings).

A 100litre compressor shall be provided to provide the spray.

A drip pan to be provided beneath the lubrication station to drain away excess oil

Where the chain and trucking requires a different lubrication system, detailed literature of the lubricating system shall be provided to accompany the bids.

The Trucking Connectors

The connectors shall be in two halves and secured by means of bolts and nuts.

The Inspection Trucking

This shall be of suitable length and similar to the chain trucking but open at the top and provided with a removable cover.

Overhead Chain Conveyor Dimensions

Number of Horizontal bends = 12

No. of 30 degrees vertical bends with open side on outer circumference = 8

Number of 45 degrees vertical bends with open side on outer circumference = 12

No. of 30 degrees vertical bends with open side on inner circumference = 8

Number of 45 degrees vertical bends with open side on inner circumference = 12

No. of 60 degrees vertical bends with open side on outer circumference = 6

No. of 60 degrees vertical bends with open side on inner circumference = 6

Outer circumference length of Tensioner = to match the chain.

No of inspection covers = 10 minimum

Length of straight trucking = 1400 ft

Total length of chain = 1400 ft

Number of hooks with connecting set of U-shaped shackle and pin = chain length / 4 ft.

Number of drive units = 2

Number of trucking connectors = sufficient for the chain

Lubrication system = 2

INSTALLATION

The monorail shall be installed such that the bottom of the hook is 1.8m from the ground in the withering floor and 1.5m from the ground at the offloading point.

The installation contractor shall provide all consumables and materials for supporting the monorail on the building structure. The supporting members shall be strong to resist any vibrations and loads.

TECHNICAL DATA

The supplier shall submit a detailed brochure of the overhead chain quoted for.

Technical data sheet

The bidder to fill in the technical data required below.

Item	Description	Suppliers data
1.	Make and origin	
2.	Chain type-open/closed	
3.	Trunk length-ft	
4.	Drive make	
5.	Drive hp rating	
6.	Chain speed range	
7.	Chain pitch	
8.	Bending radii (horizontal/vertical)	
9.	Effective chain speed (m/min)	
10.	Point load capacity	
11.	Method of lubrication-spray type /other	
12.	Hook diameter	
13.	Method of joining the chains	
14.	Spare drive unit provided?	
15.	Delivery (from order)	

2. SPECIFICATIONS FOR WITHERING TROUGH, RADIATOR, TRANSITION PIECE & FAN -

88FT WITHERING TROUGH

2.1 WITHERING TROUGH SPECIFICATIONS

To be made from 1.5mm gauge mild steel sheet.

Length of trough = 88ft

Width of trough = 6ft

Vertical height of trough = 3ft

Sections of side panels 8ft x 3ft = 22

Weld Mesh Bed of 8ft x 6ft = 22

Vertical height of position of the weld-mesh = 26¹/₂"

Green plastic mesh should cover full trough bed (i.e. 480 sq. ft.)

Trough bottom external side reinforcement and alignment piece should be a 1 ¼" by 1 ¼" x 1/8" angle irons. These are welded on the section. Trough top edges are bent over and welded on a 30mm square RHS. The adjacent section joint angles should be bolted

together with 6 Nos. 10 mm ($\frac{3}{8}$ " diameter bolts, washers and nuts equally spaced. The closed end trough section should be provided with an inspection door as per drawing. The weld-mesh bed frame should be made from 1 $\frac{1}{4}$ " by 1 $\frac{1}{4}$ " x $\frac{1}{8}$ " angle irons while the mesh size is 50mm x 50mm x 4.0mm square mesh. Green plastic mesh should cover all the weld-mesh bed. For holding the green-mesh onto the weld-mesh bed, 1 $\frac{1}{4}$ " x $\frac{1}{4}$ " flat bar shall be used.

Two coats of Ivory paint should be applied over a Red Oxide primer except on the inside surfaces above the green mesh which shall be Mercedes Green paint.

See details for trough on drawing (To be collected from KALRO – TRI Engineers)

2.2 STEAM TO AIR HEAT RADIATORS SPECIFICATIONS

The cross-sectional dimensions of the radiator casing is 74 $\frac{1}{2}$ " wide by 26 $\frac{1}{2}$ " high on the flanged section. The finned tubes should be located vertically along the length of 2" steam inlet header pipe and a 2" steam condensate drainpipe. The radiator casing material of construction shall be 2mm thick mild steel sheet.

A **2" Tee** and **2" to 1" steam concentric reducer** shall be welded to the steam header inlet pipe while a 2" bend and 2" to $\frac{1}{2}$ " **eccentric reducer** shall be welded on the condensate drainpipe.

The fin carrier tubes should be made out of minimum $\frac{3}{4}$ " internal diameter high carbon steel tube. The fins to be made out of aluminium of such thickness as to have at least eleven (11) fins per every inch of carrier tube should be $\frac{3}{4}$ " on either side of the tube. The width of the fins edge to edge will be minimum 2 $\frac{1}{2}$ " and the interspaces between the two adjacent column fins shall be 1".

The radiator should be able to withstand a pressure of 150 Psi at temperature of 140°C. The design of the radiator should be such that it allows for 15% fouling.

The final paint should be heat resistant Aluminium.

2.3 SPECIFICATIONS FOR TRANSITION PIECE

Shall be air flow stream-lined and made from 1.5mm Black Iron Sheet Metal. A flange matching with the flange of the radiator casing should be welded on the trough side.

A ring similar to the flange of the fan casing should be welded on the inner face of the transition piece on the fan side.

Two coats of Ivory paint should be applied over a Red Oxide primer.

Total length of transition piece = 1200mm.

2.4 SPECIFICATIONS FOR WITHERING FANS

Withering trough axial fan (29,000 cfm)

To be axial flow type made out of die cast Aluminium-Base Alloy Metal: Sand casting not acceptable. Each fan should have blades of 24" radius so as to make overall fan rotor diameter of 48".

Fan to be coupled to a suitably sized 3 phase 50HZ truly reversible type motor so as to give 29,000cfm and the noise level not to exceed 70db I metre from source.

- Fan capacity: - (~~25000cfm~~ -29,000 cfm) – airflow at 16°C to 29°C on either direction.
- The fan should draw currents between (8amps – and a maximum 10amps)

STATIC PRESSURE

The fan to work at an average altitude of 2003 metres above sea level and against static pressure of 13mm W.G. (0.5" W.G.). The noise level from the fans should not exceed **70 db at one metre (1m) from source.**

The blades should be painted yellow.

MOTORS

All motors shall be **Cast Iron Motors. ABB, SIEMENS, CROMPTON GREAVES, WEG, BROOK CROMPTON with EFF1 label on the name plate** of high power factor (HPF) and high efficiency ≥ 0.86 , 415 volts, 3 phase 50 Hz and IP55 level of protection. They should have class F insulation as per BS 2757.

MOTOR TERMINATION

The motors will be terminated to a terminal block on the fan casing through a flexible conduit.

FAN CASING

Length of Fan Casing = 24"

Internal Diameter = 48 1/4"

Flange to be made from 50mm x 4.5mm Black Iron Sheet Metal

The casing should be finish painted with Ivory Paint over a Red Oxide Primer.

FAN GUARD

To be made from 1.5mm Black Iron Sheet Metal.

Dimensions of bigger diameter = 1320mm

Dimensions of smaller diameter = 1221mm

Weld mesh size to be welded on bigger diameter = 50 x 50 x 4mm

Maximum height of mesh cone from bigger diameter = 150mm

Diameter of mild steel rod to be welded round the bigger diameter = 13mm (0.5")

The final paint should be Signal Red.

Flange to be welded on smaller diameter and this should match with flange of the fan casing.

SUBMITTAL DATA - FANS

All bids should be accompanied by fan performance curves, and the data sheet below for the fan and motors should be filled.

Item	Description	Specification
1	MOTOR DETAILS	
a)	Make	
b)	Hp rating	
c)	Speed –rpm	
d)	IP rating	
e)	PF rating	
f)	Efficiency	
2	FAN DETAILS	
a)	Fan make and origin	
b)	Method of casting	
c)	Casing diameter	
d)	CFM rating	
e)	Static head rating –mm W.G	
f)	Noise level –1meter from source.	
3	Warranty	

3. CONTINUOUS WITHERING MACHINE

The machine should have two components – CCW – continuous chemical withering machine and CPW- Continuous physical withering machines. They should have a holding capacity of 30,000kg/hr.

The machines should be suitably designed to achieve uniform wither. The machines should be supplied complete with all electrical field wiring and interconnecting and feeding conveyors. The bidders should include full layout of the equipment and technical specifications.

4. WITHERED TEA LEAF WEIGH FEEDER

Capacity – Shall convey 6,000kg/hr of withered tea leaf.

Accuracy- 0.5% of the set point

The weigh feeder shall be the belt feeder type and will consist of a suitably sized hopper on top of conveyor belt. The belt shall have load cells, which will measure the amount of withered tea flowing through it. An LCD Screen shall indicate the amount fed on real time basis.

OPERATION MODE

The feed hopper or reservoir shall receive withered leaf from a feed conveyor from the withering floor. The hopper shall have level sensors that are wired in such a way that the conveyor shall stop once the set top holding limit is attained and start the conveyor when the tea drops to the lower limit

The amount of feed shall be controlled by the gap between the hopper and the belt and also by the speed of the belt.

OPERATION

The system shall;

- Allow for completely unattended operation. The system should run automated without any intervention whatsoever and deliver a regulated and highly consistent flow of leaf to the rotor vane. The system must incorporate an independent stainless steel buffer/reservoir arrangement to cope with frequent irregular feed from withering.
- Have a closed loop self regulating system to ensure continuous flow of withered leaf. Include all electrical controls to control all the pre-feeding conveyors. (Provide control for six numbers conveyors driven by 3hp motors)
- Provide for audible alarms to be stationed in withering floors.
- Allow for manual override in event of failure to allow for manual running.
- Have controls at the main control panel as well as at the weigh feeder itself.
- Have self-calibrating features.

CONSTRUCTION

1. The system shall work continuously with minimal maintenance.
2. All material parts in contact with the leaf must be food grade (belts and plates).
3. Belt drift protection must be incorporated – self tracking and drift limit switch.
4. Belt must be food grade 1m wide-or as per suppliers design parameters- and shall be easy to replace
5. All electronic should be waterproof to IP67 at suitable for wash down environments.
6. Machinery shall be coated with corrosion resistant paint eg epoxy.
7. Electrical panel supplied with the system shall be free standing, 415v, 3 Phase and have all the necessary protection. The panel shall be of high quality construction with a powder/eggshell coat finish. The panel shall be installed within 20m radius of

the machinery (Rotorvane). Electrical and electronic equipment shall be of reputable brand and spares readily available.

8. The overall system size shall be within 10m (length) X 2 Metres (Width).
9. Drums on conveyors shall be rubber lagged to prevent slip.

INFORMATION

The system output shall display

1. Flow rate.
2. Hours worked per day, week, month and year.
3. It should allow logging of a master total and shift totals.
4. The daily, weekly, monthly and yearly master totals and the totals to be read only but the user can select the period to consider.
5. Average hourly flow rate = daily master totals divided by the hours worked.
6. monthly average hourly flow rate = monthly daily master totals divided by the hours worked
7. Plant utilisation = monthly average hourly weighfeeder flow rate

Installed driers capacity (..... kgs/hr) x 2.87

The installed driers capacity and 2.87 constant to be input manually

8. It should allow logging of a master total and shift totals.
9. The system shall have self-diagnostic features allowing diagnostics to be carried out by the factory technicians.
10. Control console with requisite control instrumentation and display unit complete with a **RS-485 interface for communication to PC software** to enable trending of the various process parameters as 1-5 above.

INSTALLATIONS

1. Supplier shall supply equipment, install and commission; in addition supplier shall be on site during the start up of the entire production line.
2. Supplier shall connect to the system all necessary withering conveyors-minimum of six.
3. Supplier shall train factory staff on operation and preventive maintenance of the system.

SAFETY

1. All moving parts shall have guards.
2. System shall have local and remote emergency stops.
3. System shall provide for loud audible alarm on start up.

WARRANTY

- System shall be warranted for a minimum of 15,000 operating hours or two years continuous use whichever comes first.

SUPPORT AND EXPANSION

- Supplier shall state local after sales service support availability.
- Supplier shall provide written confirmation for the parts availability and the availability of trained support staff.
- The system shall be expandable to allow connection to PLC'S and other process control equipment e.g. Remote printing, remote printing and remote display.

REFERENCES

Supplier to provide reference where they have installed similar equipment and has been in operation for at least four years.

MAINTENANCE MANUAL

Supplier shall provide user and maintenance manual

5. ELECTRONIC WEIGHING SCALES

a. 150 KGS ELECTRONIC PLATFORM SCALE – SORTING SCALE.

SPECIFICATIONS

1. Heavy-duty industrial electronic platform scale with a weighing capacity of up to 150kg.
2. Weighing accuracy of 100 grams.
3. Scale platform dimensions should be 0.8m x 0.8m with a hardwearing steel surface.
4. The loadcells should be of high quality type capable of weighing overhangs of 1m on both sides with one/four load cell(s), The loadcell(s) should be dust, water, rust and shockproof.
5. The scale should have an RS 232 or USB port connection and configurable to communicate to a PC. Must have an RS 232 cable terminated as required.
6. Should have a bright backlit display easy to read in dark environments.
7. The scale supply to include an automatic voltage stabilizer (AVR type) for safe and stable power connection.
8. The display to be dust proof and be integrally attached to the scale.
9. Scale must be Kenya Weights and Measures approved.
10. Scales should have a minimum of **one-year's guarantee.**
11. The Final colour to be approved by KALRO - Tea Research Institute before delivery.

b. 200Kgs ELECTRONIC PLATFORM SCALE – PACKING SCALE SPECIFICATIONS

1. Heavy-duty industrial electronic platform scale with a weighing capacity of up to 200kg.
2. Weighing accuracy of 50 grams.
3. Scale platform dimensions should be 1m x 1m with a hardwearing steel surface.
4. The load cells should be of high quality type capable of weighing overhangs of 1m on both sides. There should be at least four load cells, one each at the four corners. These load cells should be dust, water, rust and shockproof. Expect severe shock loads from a 75kg forming box.
5. The scale should have an RS 232 or USB port connection and configurable to communicate to a PC. Must have an RS 232 cable terminated as required.
6. Should have a bright backlit display easy to read in dark environments.
7. The scale supply to include an automatic voltage stabilizer (AVR type) for safe and stable power connection.
8. The display should be housed in a lockable dust proof stand alone **steel cabinet**.
9. Scale must be Kenya Weights and Measures approved.
10. Scales should have a minimum of **one-year's guarantee**.
11. The Final colour to be approved by KALRO-TRI before delivery.

c. 500Kgs ELECTRONIC PLATFORM SCALE – GL SCALE SPECIFICATIONS

- a) Heavy-duty industrial electronic platform scale with a weighing capacity of up to 500kg.
- b) Weighing accuracy of 0.1kg.
- c) Scale platform dimensions should be 1.2m x 1.2m with a hard wearing steel surface.
- d) The load cells should be of high quality type capable of weighing overhangs of 1m on both sides. There should be at least four load cells, one each at the four corners. These load cells should be dust, water, rust and shock proof.
- e) Scale should have an open top cage with three sides, measuring 1.2m x 1.2m x 0.8m high with 50mm x 50mm x 4.5mm wire mesh welded on a 2” diameter black pipe. Scale should accommodate minimum 10 bags of leaf of approximate 15kg each.
- f) The scale should have an RS 232 or USB port connection and configurable to communicate to a PC. Must have an RS 232 cable terminated as required.
- g) Should have a bright backlit display easy to read in dark environments.
- h) The scale supply to include an automatic voltage stabilizer (AVR type) for safe and stable power connection.
- i) The scale display to be housed in a lockable dust proof stand alone steel cabinet.
- j) Scale must be Kenya Weights and Measures approved and stamped.
- k) Scales should have a minimum of **one-year's guarantee**.
- l) The Final colour to be approved by KALRO-TRI before delivery.

d. 3000 Kgs CAPACITY - PALLETIZED SCALE.

SPECIFICATIONS:

- a. Heavy-duty industrial electronic scale 3000kg capacity.
- b. Accuracy of 0.5kg.
- c. Overall size 1.5m x 1.4m
- d. Scale should be the U type model constructed in such a way as to allow weighing of a pallet with use of a hand pallet truck.
- e. Scale should not require a pit and should be shock proof and easily movable to allow weighing in various factory locations.
- f. Scale should be dust and waterproof. The complete system should be suitable for operation in a dusty environment.
- g. Supply to include a printer where a user be able to enter relevant details including:-
 - i. **Grade of tea**
 - ii. **No of packages for every weighing**
 - iii. **Officer name**
 - iv. **Vehicle registration**
 - v. **Driver details**
 - vi. **Invoice No.**
 - vii. **Delivery details.**
- h. The report obtained should be a single document report showing itemized details for each pallet weighed including totals. In addition the report should show all the details in point 7.
- i. The display unit and printer should be supplied with a dust proof and lockable stand-alone steel cabinet.
- j. Should have a bright backlit display easy to read in dark environments.
- k. The scale supply to include an automatic voltage stabilizer (AVR type) for safe and stable power connection.
- l. Scale must be Kenya Weights and Measures approved.
- m. Scale should carry a minimum **one-year guarantee.**

6. ROTOR VANE 450MM (18")

PRODUCT SPECIFICATION

The Rotor vane shall receive withered leaf (2 leaves and a bud withered to between 65%-67% MC) for maceration in preparation for cutting, tearing and curling (CTC) process. The Rotor vane shall process withered leaf amounting to not less than 2200KgGL/hr at a motor load current of not more than 35Amperes.

MATERIAL SPECIFICATION

All internal components in contact with withered Tea leaf shall be made from food quality Non Magnetic AISI 304 stainless steel.

The Rotor vane shall have a Barrel diameter of 450mm (18inch) having a 205mm (8inch) pitch worm and supplied complete with forward vanes, resistors and iris end plate. The main shaft shall be made from strong anti-corrosion food grade Austenitic Stainless Steel.

The Rotor vane shall be driven by a fan/air-cooled 30HP, 1440RPM, 415 Volts, 50Hz AC motor through a reduction gearing and V belts so as to produce output rotor speed of 35RPM at the main shaft. The Gearbox shall be *Radicon/Greaves* or equivalent, size U1000, with a speed reduction ratio of 20:1. The rotor vane shall be mounted on a solid and robust skid frame. The drive pulleys, belts, coupling and all open rotating shafts shall be fully guarded with stainless steel guards sufficiently perforated for aeration.

OPERATION

Withered leaf is fed into the Rotor vane through a chute made from 1.5mm thick stainless steel sheet fitted into a 305mm (12”) square opening on the Rotor vane barrel. The macerated leaf shall be discharged through a 1.5mm stainless steel chute fixed to exit at lower half circumference of the barrel by bolting.

The end plate shall be stainless steel, IRIS type, with clear angle setting markings. The end plate shall also be provided with easily removable stainless steel guard.

The machine shall have guards fitted with limit switches able to switch off the drive motor upon opening. The switches shall be water proof of IP55

MAINTENANCE

The Rotor Vane shall be maintainable on the run. The barrel shall be easily removable from the main shaft through a suitable mechanism. Rack and pinion mechanism is preferred.

All bearings shall be easy to maintain; clean, lubricate, extract and replace etc.

Tools especially for barrel and bridge maintenance, instruction manuals must be supplied.

The Rotor vane shall be finish painted over a primer with Mercedes Green gloss paint. Sufficiently long holding down bolts of 19mm (³/₄ inches) diameter with nuts and washers shall be required for site work. Also supplied together shall be properly dimensioned foundation and machine drawings all for ensuring proper installation.

SPARES TO BE SUPPLIED WITH THE ROTOR VANE

❖ **Recommended spares but include items and quantities described below:-**

Item	Description	Quantities
1.	Bearing(s) for the main shaft,	1 each
2.	Bushes for the bridge	2pieces
3.	Bridge	1 piece
4.	Drive belts.	2 sets
5.	Stainless steel bolts for resistor mounting	1 set

Health and Safety

See attached document.

7. 42” TRIPLEX CTC MACHINE

a. Product specification

The CTC shall receive macerated tea from the Rotor vane. The macerated tea shall be exposed to cutting(C), tearing (T) and curling(C) to obtain dhool as a product.

b. Construction and material specifications

The unit shall be Triplex CTC machine consisting of a 13” diameter with 8 TPI stainless steel cutting rollers. The CTC rollers width shall be 42” and shall be driven by suitably sized motors as specified later below. The Roller segments shall be of high quality AISI 304 non-magnetic stainless steel. The rollers shall constitute segmented rings which shall be seamless forged and sharpened.

The CTC unit shall integrally be fitted with a full belt width ball breaker at the final discharge end. The ball breaker shall be housed in not less than 3mm AISI 304 stainless steel sheet metal casing having adequately sized discharge opening. The front part of the ball breaker casing shall be easily and quickly removable in case of a breakdown and for cleaning purpose.

The Ball breaker shall be on stainless steel shaft mounted on Plummer block ball bearings. It shall have suitable stainless steel beater rods suitably welded to form the ball breaker. The driving motor shall be directly coupled and suitably sized for EFF1 to operate at 960 rpm, 415 volts, 3 phases, 50 Hz AC cast iron motor.

The CTC main conveyors shall be driven from the main CTC roller drives and fitted with de-jamming mechanisms for emergency disengagement. Conveyors shall be self tracking and aided by means of stepped drum rollers.

The unit shall be supplied complete with strong iron chassis frame and supports, conveyors, tensioners and de-jamming system. Before the first cut there shall be a

spreader, heavy duty magnet assembly above the belt and effective over the entire width of the belt.

Safety guards shall be provided for all the moving parts.

The conveyor belts shall be endless food quality, 3 ply construction 4mm thick and made out of plain dry rubber or PVC with tension of 24N/mm and which shall be FDA approved.

The CTC shall have CTC roller top moving covers complete with scrappers all made from food grade material. The covers shall be effective in arresting spillages and guaranteeing safety.

The CTC shall have the main conveyors' side scrappers/guides adequate enough to feed the full width of the CTC rollers with the macerated leaf/dhool.

The CTC main conveyors' end scrappers shall be rigidly/firmly supported not to warp at the middle in order to ensure effective scrapping.

The CTC shall be supplied with sufficiently sized anchor bolts complete with nuts and washers for the grouting works.

The CTC shall be finish-painted over a primer with Mercedes Green paint.

c. Power transmission to segments

Rollers shall be driven through a two-output-shaft gearbox with 1:10 ratio coupled to low speed and high speed CTC rollers respectively via heavy duty universal couplings.

The CTC machines shall, preferably, incorporate the following features: -

1. Slow speed and high speed rollers shall be interchangeable.
2. Axial pitch adjustment device.
3. Bolt free cassette type roller housing.
4. A de-jamming mechanism that allows the rollers to resume the original setting.
5. Single knob fine cut meshing setting.
6. The roller lift mobile crane.
7. Automatic rollers cover cleaning mechanism.
8. Adequate safety aspects to protect working staff from all moving parts i.e. all pulleys; drive belts, spreaders and iris plate shall be fully enclosed in the guard. Open shafts e.g. universal joints shall be fully covered **using 1.5mm stainless steel perforated sheet.**

Maintenance tools, operation and maintenance manuals, layout/foundations drawings and packing list shall be supplied with the machine. All components should be clearly marked prior to delivery for identification and ease of assembly.

❖ **Initial Spares stock shall be as recommended by the supplier but include the following:-**

Item	Description	quantity
1.	Drive belts	2 sets
2.	Spare set of C.T.C Belt conveyors-One for each cutting unit.	4 pieces
3.	Spare set for each C.T.C Rollers for each cutting unit complete with bearings and housings.	3 sets
4.	Complete set of spare drive-Belts for each cutting unit.	3 sets
5.	Cardan Joints - universal joints.	4 pieces
6.	Electric motor- 30hp EFF1	1 piece

d. Motors

All motors shall be ABB or **equivalent for** High Power Factor (H.P.F) and High efficiency (EFF1) cast iron body. All geared motors shall be supplied with Food Grade Oil (*BP Shell Cassida GL 320* or equivalent).

e. Panel

Scope

All starters for the rotor vane and the CTC shall be incorporated in the same panel.

Specification

The Panel shall be manufactured for food industry and shall be free standing with mild steel plates. Once dried, it shall be coated with dry powder epoxy paint and cured in the oven at least 160° C-180° C for not less than 15 minutes. An even fume thickness of 90-100 micron must be achieved on the final product. Final colour shall be Tango Orange (**06E51**). The Panels shall be supplied wired completely up to the termination blocks.

The motor control centres shall meet the recommendations given in the latest editions of the following standard: -

- IEC 439-I** - Construction Clauses
- IEC 529** - Degree of protection.
- IEC 68-2-11** - Defining resistance to salt and mist
- IEC 66-2-30** - Defining resistance to damp heat

The motor control centre shall be designed for a rated voltage of **415 volts T.P.N.**

The control voltage shall be **240 volts S.P.N**

The Busbar shall be braced with special insulators and rated for **415-460 volts T.P.N.**

The forms according to IEC 439-1 shall be **Form 4.**

The degree of protection - **IP55.**The Panel shall consist of *Telemecanique* Product (**Genuine Product from France**) or equivalent.

All **Main M.C.C.Bs, motor rated M.C.Cs.** shall be of the Type Tested Assembly. (Partially type tested assembly shall not be acceptable).

All protection shall be M.C.Bs (3 phase or Single phase) and M.C.C.Bs (**Adjustable setting**).

All components for the starters should be selected as per **type 2 co-ordination**.

All starters shall be wired in sequential operation (**As shall be advised by the TRFK Electrical Engineer**)

All panels shall not be more than **2200mm in Height** and must be compact and neat in size and construction.

All panels shall be **bottom cable entry**.

The Panel shall incorporate:

- Emergency lockable Stop Button to control all the motors control circuits,
- Start Buttons (**Green**),
- Stop Buttons (**Red**),
- Run Indicators (**Green**),
- Trip Indicators (**Yellow**),
- RYB Indicator lights (**Red, Yellow, Blue**),
- 96mm x 96mm Mains Voltmeter with phase Selector Switch,
- 96mm x 96mm Mains Ammeter for each motor
- Digital 3 phase 4 wire kWh meter flash type.

f. Wiring Drawing/Manuals

A complete wiring drawing should be supplied with the control panel. The components in the control panel should be labelled to match the wiring drawing. The machine should be supplied with an operations and maintenance manual.

g. Installation and commissioning

The supplier will deputize their Engineer at the own cost (air fare, food and lodging) for the installation, commissioning and training. The client will provide semi skilled labour and will do the civil works necessary during the installations.

h. Health and Safety

See attached document.

8. CONTINUOUS FERMENTING MACHINE - AUTOMATED

- **PRODUCT SPECIFICATIONS**

The product to be fermented is dhool, processed from withered tea leaf which has been macerated through a Rotorvane and Triplex CTC, with the following physical characteristics:

Colour Green
Moisture Content (w/w) 67% +/- 2%

CTC AND ROTOR VANE TECHNICAL DATA SHEET		
▪ ROTOR VANE		
Item	Description	Manufacturers Data
1	Number of vanes and resistors	
2	Barrel material	
3	Guarding interlock provided?	
4	Guarding material-perforated guard or expanded metal	
5	Vanes and resistors-forged or cast	
6	Motor make, IP rating & Efficiency	
7	Control panel provided c/w starter, isolator, ampere meter, and voltmeter.	
CTC TECHNICAL DATA		
Item	Description	Manufacturers Data
1	Guarding interlock provided?	
2	Guarding material-perforated guard or expanded metal	
3	Motor make, IP rating & efficiency	
4	Motors hp ratings	
5	Control panel provided c/w starter, isolator, voltmeter, ampere meter.	

- **PROCESS PARAMETERS**

Line Throughput 2500kgs

GL/hr

Total Fermentation time/duration 80 -100 minutes

Dhool temperature 22^oC – 35^o C
(70^oF – 95^o F)

Dhool depth: **Optimum** 4 inches (100mm)
 Maximum 6 inches (150mm)

Maximum Process Air RH 95%

Minimum Process Air RH 65%

- **SCOPE OF SUPPLY**

Two stage continuous fermenting machines of modular construction complete with Drive units – gearboxes and corresponding drive assemblies. Each stage or fermenter to be complete with the following:

1. Modules with either **independent OR centralized air supply** and shall include:
 - i. Suitably rated air fan,
 - ii. Effective Humidification system control and indication unit.
 - iii. Temperature control instrumentation and indication unit
 - iv. Flow rate control and corresponding display and instrumentation
 - v. Suitable sized up-turners
2. Adjustable Dhool spreaders with graduated depth gauge.
3. Each of the two stages shall have three automated leaf up-turners that shall be triggered by pre-set dhool temperature.(override switch should be included)
4. Each of the two units shall have one graduated plough located between Up-turners
5. A mid Ball breaker at the end of the first stage; to either discharge directly onto the second stage or to intermediate traverse conveyor.
6. Adjustable Rotary cleaning brushes appropriately fitted under the belt and positioned on the return circuit to effectively remove any residue dhool particles. The particles shall be collected in a removable AISI 304 stainless steel tray.
7. Automatic on line continuous belt cleaning system shall be provided. Each fermenting stage of the unit shall be equipped with a WASH-IN-PLACE (WIP) system to enable the semi-automatic cleaning of the belt on the return circuit (load free). The system shall operate on the following principle; Washing nozzles or jets to spray water or cleaning fluid over a given contact surface area and located such that the dirty surface is subjected to direct

impingement by the cleaning spray. A secondary set of nozzles to provide air jets onto cleaned wet surface for blow- drying purposes. The cleaning fluid should be drained away.

8. Control console with requisite control instrumentation and display units Complete with a **RS-485 interface for communication to PC software** to enable trending of the various process parameters, e.g. temperature, humidity, time etc.

The data thus stored shall be used to generate graphical temperature profile along the CFU for any given date and time on the computer when required and as required.

9. A full complement of instruments complete with **neatly** laid field wiring.

10. Rotary disc space humidifier, one mounted above each stage, complete with controller OR Humidistat.

11. Module 1 of the first stage CFM shall have a dedicated fan and radiator and humidifier. It shall have a solenoid valve, ½” dia. HV3 gate valve at the inlet and ½.” dia steam trap, 1/2 “ dia check valve, ½” sensor chamber and ½ “ HV3 isolating valve. All these fittings shall be *spirax sarco* or equivalent.
Note that steam radiator are not necessary in the rest of the modules

12. Critical Spares to be supplied

Item	Item Description	Quantities Recommended
1.	Humidity sensors – 4nos	4
2.	Temperature sensors – 4nos	4
3.	Temperature controller – 2nos	2
4.	Air flow meter	2
5.	Humidity controller – 2 nos	2
6.	Speed sensor - 1 no	1
7.	Up turner motor – 2 no	2
8.	Main drive motor complete with VSD Drive – 1no.	1
9.	PES Belt – for one stage.	1 stage

- **GENERAL DESIGN CRITERIA**

- a) **DIMENSIONS**

The CFM shall comprise two stages of equal lengths each, modular in design and of similar features as outlined below unless otherwise specified. The first stage fermenter shall discharge into the second stage, in tandem, through a mid-ferment ball breaker.

The **total** and **effective** fermenting belt width shall be **2200mm** and **2000mm** respectively **OR** such width as space available will dictate **BUT** within limits that shall **NOT** negatively impact on the smooth flow of dhool and fermentation process.

❖ *Where “effective”, in this context, refer to the area over which fermentation or oxidation takes place*

The Fermenter shall be set at such a height that shall accord the Operator easy access and view to equipments and dhool. A cat walk shall be provided.

MATERIAL OF CONSTRUCTION AND GENERAL INSTRUCTIONS

All parts in contact with the product and process air shall be constructed using AISI 304 Stainless Steel. Product contact surfaces should be free of pitting, pinholes and any hairline cracks that can cause material penetration/ingress and hence pose cleaning difficulties.

Use of perforated **PVC** for belting material in the main fermenter body is **NOT** acceptable

The Plenum chamber design and construction must allow uniform air distribution across and along the chamber. The chamber shall be constructed using 1.5mm AISI 304 stainless steel, creased to strengthen against vibrations.

The CFM feed conveyor (PVC) belt shall be food quality. A certificate from recognized regulatory bodies e.g. FDA is required as proof of compliance

Ducts, plenum and other enclosures shall be provided with either sliding inspection windows and/or hinged inspection doors. In the former case the window shall be fitted with shatter-proof clear glass or 3mm thick Perspex. All hinges must be placed on the outside of the equipment and be accessible for easy cleaning.

RESIDENCE TIME, DHOOL DEPTH AND TEMPERATURE CONTROL

The residence time control shall be achieved through a Variable Frequency Drive (VFD) which shall be calibrated and factored, for each CFM, to display the residence time in minutes.

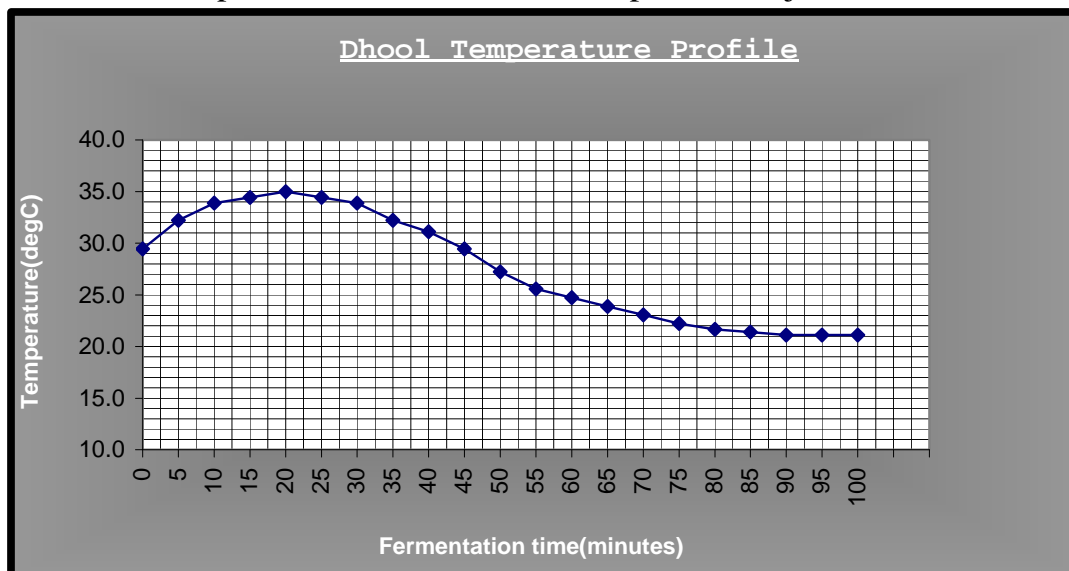
Use of **gear trains and Stepped pulley** arrangements as a means of speed variation shall **not be accepted**.

The Spreader shall be made out of AISI 304 stainless steel with the paddles/blades serrated, and should not cause compaction of dhool during operation.

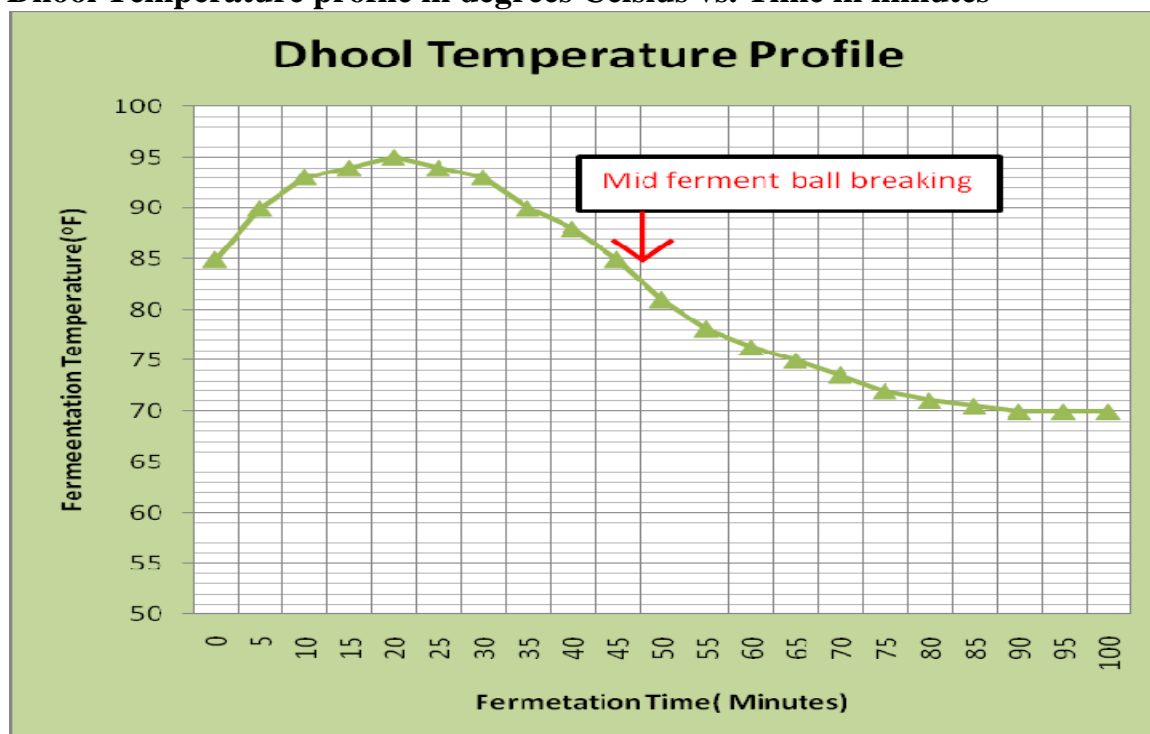
The spreader shall be mounted to enable easy variation of the spreader height and subsequently dhool depth. A scale with calibrations in metric (mm) and corresponding readings in imperial (inches) should be provided on the fermenter body to aid in the accurate adjustment of the spreader height.

The air control baffles in the main and module ducts should be operated from **fully open, half open to fully closed** positions, with these positions clearly marked on the control lever mechanism. The desired air flow shall be 680 CFM per module when the baffle is fully open. The system must be able to produce the following dhool temperature profile (chart 1), within an accuracy of +/- 2°C in the course of

fermentation, **without** drying the top layer of the dhool. Air Pre-heater utilizing steam should be incorporated to assist in dhool temperature adjustments.



Dhool Temperature profile in degrees Celsius vs. Time in minutes



Dhool Temperature profile in degrees Fahrenheit vs. Time in minutes

LEAF UPTURNERS, PLOUGHS and BALL BREAKER

Each stage of the fermenting machine shall be equipped with one Leaf Up-turner and a Plough with the Up-turner positioned midway along the machine. In its operation, the Up-turner shall be **effective** in turning/exposing the bottom layer of dhool to the surface. Both Up-turner and ploughs shall be made out of AISI304 Stainless Steel and properly guarded.

A Ball breaker shall be mounted at the end of the first stage fermenter, preferably dhool should be discharged directly into the ball breaker.

BEARINGS

All bearings must be of **GENUINE SKF** make or equivalent and easily accessible for inspection and lubrication. All bearings shall be protected from any form of material/particle ingress.

LUBRICATION

All lubrication oils and greases shall be food grade.

CLEANING

NB: If not a standard feature, the system specified below should be quoted for as a separate optional item over and above any existing system.

Each fermenting machine shall be equipped with a WASH-IN-PLACE (WIP) system to enable the semi-automatic cleaning of the belt on the return circuit (load free). The system shall operate on the following principle; Washing nozzles or jets to spray water or cleaning fluid over a given contact surface area and located such that the dirty surface is subjected to direct impingement by the cleaning spray. A secondary set of nozzles to provide air jets onto cleaned wet surface for blow- drying purposes.

COLOUR

The CFM frames shall be painted Green **14 C 39** BS4800 Colour range

• INSTRUMENTATION

The following instruments shall be supplied (as a minimum) with the fermenting machines:

- Thermometers (for process air and dhool temperature sensing)
- Throughput timer
- Precision Hygrometer

Temperature and RH displays (of appropriate IP rating) should be mounted on the fermenter frame for ease of monitoring.

• ELECTRICAL SPECIFICATIONS.

• Motors

All motors shall be *Asea or ABB* High Power Factor (H.P.F), High efficiency motors (**EFF1**) *or* equivalent but approved and cast iron body. All geared motors shall be supplied with Food Grade Oil (BP Shell Cassida GL 320 or equivalent).

• Panel

Shall be manufactured for food industry and shall be free standing with mild steel plates. Once dried, it shall be coated with dry powder epoxy paint and cured in the oven at least 160° C-180° C for not less than 15 minutes. An even fume thickness of 90-100

micron must be achieved on the final product. Colour shall be Tango Orange (**06E51**). The Panels shall be supplied wired completely up to the termination blocks.

The motor control centres shall meet the recommendations given in the latest editions of the following standard: -

IEC 439-1	- Construction Clauses
IEC 529	- Degree of protection.
IEC 68-2-11	- Defining resistance to salt and mist
IEC 66-2-30	- Defining resistance to damp heat

The motor control centre shall be designed for a rated voltage of **415 volts T.P.N.**

The control voltage shall be **240 volts S.P.N**

The Busbar shall be braced with special insulators and rated for **415-460 volts T.P.N.**

The forms according to IEC 439-1 shall be **Form 4**

The degree of protection - **IP55**

The Panel shall consist of Telemecanique Product (**Genuine Product from France**) or equivalent.

All **Main M.C.C.Bs, motor rated M.C.Cs.** shall be of the Type Tested Assembly. (Partially type tested assembly shall not be acceptable).

All protection shall be M.C.Bs (3 phase or Single phase) and M.C.C.Bs (**Adjustable setting**).

The Panel shall be wired such that all starters are provided with timers to defeat any other motor starting before the motor being started attains its full speed.

All components for the starters should be selected as per **type 2 co-ordination**.

All starters shall be wired in sequential operation (**As shall be advised by the TRFK Electrical Engineer**)

All panels shall not be more than **1500mm in Height** and must be compact and neat in size and construction. All panels shall be of **bottom cable entry**.

The Panel shall consist of **group** Power Factor Correction Gears (**free of PCBs, Dry Powder Type**). PF correction assumed to be from 0.7 to 0.95 PF lagging.

The Panel shall incorporate:

1. Emergency lockable Stop Button to control all the motors control circuits,
2. Start Buttons (**Green**),
3. Stop Buttons (**Red**),
4. Run Indicators (**Green**),
5. Trip Indicators (**Yellow**),
6. RYB Indicator lights (**Red, Yellow, Blue**),
7. 96mm x 96mm Mains Voltmeter with phase Selector Switch,
8. 96mm x 96mm Mains Ammeter with Selector Switch,
9. Digital 3 phase 4 wire kWh meter flash type.

- **WIRES**

All wires must be insulated for a maximum voltage of 600 volts and the following colour codes shall be used during the wiring -

- | | | | |
|----|----------------------------------|---|--------------|
| 1. | 3 phase 415 volts AC Power Mains | - | Red |
| 2. | Neutral of Power Mains | - | Black |
| 3. | AC Primary Control | - | Yellow |
| 4. | Earth Wire | - | Green/Yellow |
| 5. | Strange voltage and DC circuits | - | Orange |
| 6. | Measuring circuits | - | White |

- a) **TRUNKING AND CABLING**

The trunking from panel to motors shall be painted tangerine. You shall supply and connect all motors and instruments from the control panel using appropriately sized cables

- **HEALTH AND SAFETY**

- a) **GENERAL**

All moving machinery parts to be securely guarded by use of fixed or interlocking guards or other suitable devices subject to approval by TRFK Engineers.

All machinery parts and accessories to be properly constructed to eliminate or minimise vibrations and/or noise while in operation.

Fans and humidifiers shall be rigidly mounted on anti-vibration pads where necessary.

NB: Avoid use of **Mercury** and/or **Alcohol** in the instruments or any other parts of the machines.

Any lagging and gaskets materials used shall be free of **Asbestos (zero asbestos content)**

- b) **GUARDING**

Guarding must be provided by the supplier to the requirements of the **Health and Safety at Work Act** latest edition.

The equipment and its guarding must comply with BS5304 (latest edition).

All opening guard doors must be interlocked. The interlocks shall be subject to approval by KALRO, TRI Engineers.

When a guard is opened, all moving parts must stop before access can be gained. Closing a guard must not reactivate machine. The machine must be restarted by a **Positive Operator Action (POA)**.

All switches and wiring must 'fail safe', i.e. switches normally closed when guards are closed.

The underside of conveyors must be guarded where hazards exist **without** creating a food hygiene risk.

All fixed guarding **MUST** be secured by fixings or fasteners requiring tools to remove.

All guards shall be painted Signal Red, 04 E 53 BS4800 colour range.

c) ELECTRICAL SYSTEMS

All electrical engineering components and practices shall comply with current IEE Regulations; the Electricity at Work Regulations latest edition.

All electrical equipment must have the strength and capability for the application and the appropriate rating.

All wiring and control cabinet components must be identified (numerically or alphabetically) according to terminal block designations and electrical circuit drawings. No more than two wires (except for motor starter/relay suppression components) to be connected to any one terminal (connector).

Panel isolators must be interlocked with the control panel door and have a facility for being padlocked in the off position. The control panel incoming isolator should isolate (break) all incoming supplies (power and signals).

All incoming cables to control panels must be shrouded and identified to prevent accidental contact, i.e. warning live terminals.

Emergency stop buttons must be fitted adjacent to **main** moving equipment where the equipment is remote operated (distance in excess of 5Meters from the control panel).

Emergency stops and interlocked guard control circuits should be hard wired. They must not be routed through a PLC.

All individual drive motors to have an independent on load isolator capable of being padlocked in the off position.

Circuit and layout drawings/diagrams are to be provided, together with design calculations for cable loadings, fault conditions, protective devices, ratings etc. All designs and corresponding drawings must be approved before manufacture commences.

d) NOISE AND VIBRATION

Noise level must not exceed 70dBA at one metre from source and Noise data shall be supplied for each machine.

Equipment which is likely to expose any person to vibration must be identified and vibration levels provided.

• **TESTING AND COMMISSIONING**

TRFK shall require pre-delivery tests to be carried out which incorporate the testing of safety systems and failure modes.

All safety critical components and safety systems shall be tested before despatch and during commissioning.

The testing and commissioning of safety systems to be undertaken using a pre-agreed checklist. On completion, the checklist to be signed by the supplier's and KALRO-TRI commissioning Engineers.

All drawing and documentation must be updated following any modifications carried out during testing and commissioning.

• **DOCUMENTATION, DRAWINGS, MANUALS AND TRAINING**

In the **TECHNICAL PROPOSAL**, the supplier must provide a complete set of instructions and drawings, in accordance with the requirements of the Supply of Machinery Regulations. Drawings shall clearly show the plan and side elevations as per the layout instructions above.

Any aspect of design, pertaining to CFMs, that is not covered in these set of specifications but the tenderer feels to be either **complementary** to or is **equivalent** to those stated herein, should form part of the technical proposal (as options) and where relevant shall be quoted for separately.

Test certificates must be provided by the supplier for all electrical systems in line with specifications above.

Operating and Maintenance manuals shall be supplied with the machines and the Tenderer shall conduct training for machine Operators and Artisans until they are proficient in the operations and maintenance of the machines, this is expected to last for a period of not less than **fourteen** days.

A Project plan, in weeks, detailing the CFM production period, delivery, installation commissioning and other key milestones shall be submitted with the rest of technical proposal.

9. EITHER VIBRATORY FLUID BED DRYER – 600KG/HR OR FLUID BED DRYER – 600KG/HR WITH CYCLONES

TYPE 1: VIBRATORY FLUID BED DRYER – 600KG/HR PRODUCT SPECIFICATIONS

The product to be dried is fermented dhool: – Withered tea leaf that has been macerated through Rotor vane, Triplex CTC machine and fermented for about 90minutes. The product and process specifications are as follows:

Dhool moisture content	67% +/- 2%
Dried Made tea moisture content	3.0% +/- 0.1%
Throughput (made tea)	600Kgs/Hr (peaking of 5%)

NB: *Moisture content is on wet weight basis*

Quality:

The fired teas to be black, brisk, bright, thick, pungent and free of any case hardening, balling and stewiness. The teas should be clean of fibre.

Operations:

The dryer should work on the principle of vibratory fluidised bed. Fermented dhool is fed through a feed conveyor system comprising of a spreader to regulate the feed into the drying chamber. Hot air is passed underneath a perforated grid plate carrying the wet tea. The tea bed is effectively fluidised by a combination of hot air and vibrations. The tea is dried in one pass and dry tea comes out from the other end. Almost fully saturated exhaust air is exhausted out to the atmosphere in the first part of the dryer. Fine teas carried by exhaust air passes through cyclone battery and are deposited back into the VFBD for further drying.

The dryer should be robust, easy to operate preferably with single point controls for effective fluidisation in the entire drying zones to achieve the desired temperatures. Fluidisation should be gentle and as such not to create turbulence that causes high abrasion of Tea Particles resulting in loss of bloom, brightness and exposure of fibre in the end product. The fluidisation height should not exceed 8” from the grid plate (under normal working conditions); fluidisation should be such that the **residence time distribution** across the dryer width is kept to a minimum and subsequently a reduction

in **variation** of the resulting made tea moisture content. The drier **MUST** incorporate proper Air Balance systems eliminating condensation of fully saturated air and fly off or any fall-through.

Working Conditions:

Steam Pressure: 8 Bars
Consumption: About 3.2 kg steam/kg of made tea (max)
Process Temperatures:
Wet end inlet – more or equal above 150 deg. C
Dry end inlet – less or equal 105 deg. C

CONSTRUCTION:

Plenum Chamber: -

The chamber shall be constructed in such a way that there is proper air distribution along the entire length and width of the dryer. The Plenum Chamber shall be of Aero Dynamic Profile. Any other design shall have to be approved by KTDA. Ultimately the achievement shall be steady and uniform fluidisation along the entire length of the drier.

The body plate work shall be made of carbon steel of minimum 5mm thickness and fully insulated with mineral wool of 50mm minimum thickness. You shall ensure no air leaks from the sides and floors of the chambers.

Suitable Inspection and cleaning doors shall be provided.

Drying Chamber

The drying chamber shall be fabricated with AISI-304 food grade stainless steel, 2mm thick. The fluidising grid plate shall be 2mm thick, AISI 304 SS, rigidly supported and perforated with special shaped holes, tapered in nature, to ensure no chokes and correct sustainable fluidisation. The Vertical walls shall be made of 2mm minimum thickness and AISI 304 stainless steel material while ensuring proper wall height for no fly-offs. A minimum of three Inspection Windows – 450mm x 300mm size – shall be provided in the vertical panels and shall sufficiently be sealed to ensure no leakage of tea – no gasket.

The grid plate shall be bolted firmly on the plenum chamber and under the vertical side panels it shall be properly sealed to ensure no leakage.

The drying chamber along with plenum chamber shall vibrate as a unit by a suitable eccentric driving unit from beneath on suitably sized inclined forward springs. Brackets shall be welded on the sides of the plenum chamber for securing the springs through bolting, which facilitates easier and quicker removal of grid plates for maintenance purpose. The Plenum chamber will be divided from within into mainly two temperature zones.

A fully insulated transition duct connecting the Hot air blower shall be assembled across the drier axis on the side of the transition duct. Single point air control Gears for hot air and also for cold air inlets shall be provided with marked 5 graduations minimum. The cold air mixing shall be done within the transition duct with hot air for application after the initial wet stage. The ultimate temperatures of air after mixing shall be between 95°C and 110°C.

The Exhaust System

The exhaust chamber shall be fabricated from a 2mm thick AISI 304 Stainless Steel sheet and bolted on top of the Drying chamber. It shall house the Exhaust Blowers, Multi-clones etc, which shall be in AISI 304 stainless steel

The **wet zone** of the drying chamber shall be provided with suitable numbers and sizes of exhaust blowers assembled on top with suction openings made out and each connected to a set of multi-clone, comprising of suitable numbers of individual cyclones (Cyclic re-firers) made from 2mm thick AISI 304 SS sheet.

The entrained moist and lighter fly- off teas and fibres in the exhaust humid air, picked from above the fluidised bed in the drying chamber, should be dropped by its weight to the vibratory bed from the bottom of the multi-clones, for continuation of the firing.

The exhaust humid air, now free of any tea fly offs, shall be ducted outside the factory using 1.5mm AISI 304 SS sheet chimney which shall clear the factory roof by minimum 8ft.

Another Exhaust blower will be installed near the discharge end connected to a Twin-Cyclone installed outside the Drier for entrapping the entrained fine fibres and drop in a collection chamber (stainless steel bin) and all shall be made from 1.5mm AISI 304 Stainless Steel. The exhaust hot air exiting out of this cyclone in the dry zone to be exhausted through the roof and shall clear the roof by a minimum of 8ft using 1.5mm GI chimney flanged/bolted one foot above the cyclone top.

Note: all multi cyclones and air fans within the drying/exhaust chamber shall be made from **2mm AISI 304 Stainless Steel**.

Feed Conveyor, Spreader, Ball Breaker, Feed Hopper.

A portable **Feed Conveyor** with a AISI 304 stainless steel **Spreader unit** to be supplied and mounted on top of the transition duct to feed into a **Feed Hopper** made of AISI-304 quality stainless steel sheet of 2mm thick, to help in the even feeding to the drier. The feed conveyor belt to be 3-ply construction 4mm thick and FDA approved.

A stainless steel Ball Breaker/ Spreader of 740-760RPM speed should be assembled at the bottom end of the feed hopper with suitable drive motors for breaking tea lumps and even spreading of fermented leaf into the grid plate. The ball breaker shall be fully

enclosed within AISI 304 stainless steel casing and provisions for ensuring no spillages and easy cleaning.

Dryer Discharge Conveyor

Dryer Discharge Conveyor belt to be provided at the discharge end of the drier for suitable width (not less than 18") and minimum of 3m long, and 3-ply 3mm conveyor belt shall be made of cotton and complete with drive unit (geared motor, sprockets/chain etc). NB: Ensure the conveyor is spillage free by providing appropriated brushing and guides.

Lighting: The drying chamber and the dust extraction chamber shall be fitted with suitable sealed lights for inspection through the inspection windows. The lights shall be adequate enough to light up the whole dryer, easy to replace, water and vibration proof.

Heat Exchanger: The heat exchanger shall be supplied with the following:-

1. The main isolating valve to the dryer shall be bellow sealed valve - DN80 BSA2 Flanged type (*Spirax sarco* or equivalent UK) and a steam separator sufficiently drained through a set of steam trapping system.
2. 6" dia pressure gauge complete with a siphon.
3. The radiator shall be fitted with an air vent (*spirax sarco* or equivalent) at the top steam inlet.
4. The modular type steam - air heat exchanger able to raise air temperatures from 0°C to 150 °C. The radiator bank shall be made of aluminium finned carbon steel tubing, suitable for a maximum working pressure of 150psig. The tubing shall be AST 214 grade (BS 3059/3) ERW. The fins shall be appropriately fitted on the tube to ensure optimum heat transfer. The radiator banks shall be pressure tested at 1.5 times the operating steam pressure and certified.

The fouling of finned surface would not exceed 15% for steady efficiency.

The radiator casing shall be encased in a galvanized iron, 16 gauge thickness with minimum 2inch thick mineral wool insulation to ensure maximum surface temperatures of not more than 50°C.

The steam flow to the heat exchanger is to be regulated automatically through a Diaphragm valve (*Spirax sarco* or equivalent - UK) to maintain the desired temperature in the plenum chamber of around 150°C.

Each module of the radiator bank shall be connected separately with an isolating globe valve - *Spirax sarco* or equivalent HV3; suitably sized for the radiator bank.

NB: Each bank of the radiator shall have a separate steam distribution header for separate steam supply regulation to the radiator bank.

The condensate line from each module of heat exchanger shall comprise the following:

- Isolating valve, HV3,- suitably sized -
- SG IRON STRAINER – 0.8mm perforations – suitably sized
- Steam trap FT14-10 suitably sized
- *Spiratec* sensor chamber – suitably sized or equivalent
- Screwed disc check valve – suitably sized
- One radiator bank to be fed with automatic steam control valve, KB 31 Valve, complete with SA1219 Sensor.

NB: All condensate fittings shall be of *Spirax sarco* or equivalent UK; sizing shall not exceed 1” in diameter.

The system shall incorporate a sized flash vessel to BS-4504 (with pressure release valve and pressure gauge) complete with reticulation system to utilize heat from the flash steam-fed to the air inlet radiator bank.

The down streamside of the flash vessel shall be fitted with suitably sized steam trap system consisting of isolation valve, steam trap, strainer and check valve.

NB; All condensate fittings shall be of *Spirax sarco* or equivalent UK; sizing shall not less than 1½” diameter.

Main Fans: These Hot air and Cold air fans shall be high efficiency centrifugal fans fabricated from carbon steel and able to generate the required airflow at static heads of 5” water column. These should be fitted with suitable dampers to regulate the airflow and also with safety guards. The noise level from the fans shall not exceed 70db. Test report from a reputable independent body shall be provided for noise level.

Gaskets: All gaskets shall be asbestos-free and food grade approved.

Motors: All motors shall be standard and suitable for 415 volts, 3 phase, 50 Hz and have IP-55 level of protection. They would be provided with Class F insulation as per BS 2757.

Electrical Control Panel: To comprise of sturdy mild steel panel with separate MCBs for all motor control and lighting circuits. Star Delta Starters for each motor would be provided.

Panel lights will indicate ON/OFF/TRIP status for each motor.

All electrical wiring will stand the dryer temperature varying from 18 – 160 deg. C.

The control panel shall incorporate power factor correction capacitors.

ELECTRICAL INSTALLATION

The Supplier to allow for electrical installation of panel and dryer connection within 20m radiuses of the dryer

All electrical engineering components and practices shall comply with current IEE Regulations; the Electricity at Work Regulations latest edition.

All electrical equipment must have the strength and capability for the application and the appropriate rating.

All wiring and control cabinet components must be identified (numerically or alphabetically) according to terminal block designations and electrical circuit drawings. No more than two wires (except for motor starter/relay suppression components) to be connected to any one terminal (connector).

Panel isolators must be interlocked with the control panel door and have a facility for being padlocked in the off position. The control panel incoming isolator should isolate (break) all incoming supplies (power and signals).

All incoming cables to control panels must be shrouded and identified to prevent accidental contact, i.e. warning live terminals.

Emergency stop buttons must be fitted adjacent to **main** moving equipment where the equipment is remote operated (distance in excess of 5Meters from the control panel).

Emergency stops and interlocked guard control circuits should be hard wired. They must not be routed through a PLC.

All individual drive motors to have an independent on load isolator capable of being padlocked in the off position.

Circuit and layout drawings/diagrams are to be provided, together with design calculations for cable loadings, fault conditions, protective devices, ratings etc. All designs and corresponding drawings must be approved before manufacture commences.

DRYER TEMPERATURE RECORDERS AND MONITORING

In order to **consistently** achieve the desired product quality parameter, it's imperative that the dryers are equipped with relevant instruments that will guide the Operators in the course of the dryer operation. It is for this reason, amongst others, that the Dryer shall be equipped with Temperature recorders with the following detailed specifications.

Specifications:

- a) **Temperature Range:** 0 – 200⁰ C (Degrees Centigrade) with accuracy of +/- 1% FSD
- b) **Temperature recording;** Digital and interfaced with computer system to give real time and historical temperature data/information

- c) **Power Supply:** 200 – 250 volts, 50Hz (SPN)
- d) **Computer Print outs and graph:**
 Red colour - Inlet Temperature
 Green colour - Exhaust temperature
- e) **Temperature probes and Stem:** Stainless steel probes wired to processor.
- f) **Console display unit;** The dryer shall be equipped with digital thermometer display unit to monitor the inlet and exhaust air temperatures in all the sections for the critical sections of the drier (minimum 4 points) for the operator view, visible from about 3m (font of minimum 24mm) for information – monitoring and control.
- g) **Temperature Control;** The thermometers shall incorporate facilities to trigger VISUAL and AUDIO alarms in order to alert the dryer operator whenever temperatures fall below or rise above predetermined limits. The thermometers shall be installed on each section i.e. wet and dry end, the temperature limits shall be set to trigger the alarms as follows:

<u>Section</u>	<u>Inlet</u>	<u>Exhaust</u>
Wet end	High/Low	High/Low
Dry end	High/Low	High/Low.

g) **Mounting:** The probes shall be properly secured firmly on the dryer body and their locations properly indicated in the maintenance manuals for ease of replacements. The display unit shall preferably be stand alone, free from vibration.

k) **General:**

- Exhaustive technical literature should be provided in the Technical Proposal.
- Cost of the digital temperature monitoring system should be stated separately.
- Warranties and other terms and conditions of supply should be covered in the financial proposal.
- Proposals should cover back-up services, required spares and technical capability to service and repair the instruments either on site or on ‘Return-to base’ basis.

Attached Technical data sheet (appendix II) should be filled wholly.

OPTIONAL EQUIPMENT- DRYER AUTOMATION EQUIPMENT

Manufacturers as an optional offer can separately offer an automation of the following areas

- a) Dryer feed control
- b) Dryer temperature control
- c) Air flow control.

TYPE 2: FLUID BED DRIER WITH CYCLONES - 600KG/HR

Fluid Bed Drier with Cyclones

PRODUCT SPECIFICATIONS

The product to be dried is fermented dhool: – Withered tea leaf that has been macerated through Rotorvane, Triplex CTC machine and fermented for about 90minutes. The product and process specifications are as follows:

Dhool moisture content	68% +/- 2%
Made tea moisture content	3.0% +/- 0.1%
Throughput (made tea)	600Kgs/Hr (peaking of 5%)

NB: *Moisture content is on wet weight basis*

Quality:

The fired teas to be Black, Brisk, Bright, Thick, Pungent and free of any case hardening, balling and stewiness. The teas should be clean of fibre and black in appearance.

Operations:

The dryer should be robust, easy to operate preferably with single point controls for effective fluidisation and temperatures in the entire drying zones. Fluidisation levels should be gentle and such as not to create turbulence that causes high abrasion of Tea Particles resulting in loss of bloom brightness and exposure of fibre in the end product. The height of fluidisation bed should not exceed 8” from the grid plate (under normal working conditions); fluidisation should be such that the **residence time distribution** is kept to a minimum and subsequently a reduction in **variation** of the resulting made tea moisture content. The drier MUST incorporate proper Air Balance systems eliminating condensation of fully saturated air and fly off or any fall-through.

Working Conditions:

Steam Pressure:	8 Bar
Consumption:	About 3.2kg steam/kg of made tea
Maximum Process Temperature:	150 Deg. C in the hot zone

CONSTRUCTION:

Plenum Chamber: -

The chamber should be constructed such that there is proper air distribution along the entire length and width. The Plenum Chamber may be of Aero Dynamic Profile or other design but achieving proper and uniform fluidisation along the length of the drier and ensure no fall-through teas to the plenum chamber.

Should be made of carbon steel of minimum thickness 1.5mm and fully insulated with mineral wool (rock wool) of 50mm minimum insulation thickness. The sides of the chambers and floors must ensure there are no air leaks.

The Chambers should be suitably reinforced with RHS or angle iron. It should have conveniently positioned opening of minimum dimension of 450 x 450mm for cleaning and inspection. All gaskets in use must be food grade and no asbestos gaskets shall be used.

Drying Chamber:

Minimum drying area should be stated, preferably with vibrating bed to ensure uniform and true fluid like movement of tea particles over the entire drying length. The chamber should be fabricated from AISI 304 food quality stainless steel of 1.5mm minimum thickness with appropriate structural reinforcement. The fluidising grid should be 2mm thick AISI 304 stainless steel plate. The grid plate should be rigidly supported. Sufficient observation/inspection windows should be provided in the vertical panels.

To consist of difference temperature zones for hot and warm sections
A product control gear should be provided along the entire drier side.

The Exhaust/Settling Chamber:

The settling and exhaust chambers should be made from 1.5mm AISI 304 stainless steel and suitably reinforced for structural rigidity. The exhaust system material composition is detailed here below.

- a) Wet End Cyclone, ducts and Exhaust Chimneys to be made from 1.5mm AISI 304 stainless steel. The cyclone axial flow fan casing will be made using AISI 304 stainless steel.
- b) Mid section Cyclone and exhaust chimneys to be similar as (a) above.
- c) Dry end Cyclone and exhaust chimneys: - ducts and Exhaust Chimneys to be made from 1.5mm AISI 304 stainless steel. The cyclone axial flow fan casing will be made using AISI 304 stainless steel.
- d) The fibre and dust grade teas from the Cyclones will be reclaimed by use of receptacles/ bins made from 1.5mm stainless steel (AISI 304).
- e) Cyclone fans exhaust capacity to be matched such that there is a slight negative pressure in the settling/exhaust chambers to facilitate stable drying of tea particles.

f) Chimneys should clear the **ridge of factory roof by 8 feet.**

Spreader, Ball Breaker, Hoppers:

The system should comprise of a stainless steel feed hopper and an adjustable AISI 304 stainless steel spreader for dhool levelling and control, complete with own drive. The spreader should be covered on top by a stainless steel guard. The guard should be mounted in such a way that it can be easily opened for ease of cleaning.

The ball breaker fitted at the feed end should have a suitable drive motor to match the load, i.e. refer to stated throughput above. Preferred speed is 960rpm and the beater rods/discs **MUST** be made of Stainless steel and housed in an AISI 304 Stainless Steel sheet. Provision for opening and cleaning should be made. The ball breaker should pulverize all fermented dhool prior to drying without incidence of balling or opening/flaking of leaf.

Dryer Feed Conveyor:

To be food quality PVC materials with at least 2-ply construction. **The belt's specifications should be included in the Technical proposal.** The belt **MUST** be vulcanised endless with appropriate tension-adjusting mechanism.

To be provided with suitable frames, rollers and supporting galvanized sheets and made in such a way to avoid dhool being lodged between the rollers and the belt. Belt should be of sufficient width to ensure even feeding of the Dryer to match the stated throughput. A scraper of full belt width should be fitted at the conveyor discharge end so as to press snugly on the underside of the return belt. There should **NOT** be dhool spillage or 'return' during conveyance.

Dryer Discharge Conveyor:

To be installed at the discharge end and be made of cotton/canvas 3mm thick type. The conveyor should be driven by suitably sized geared motor. It should be of sufficient width corresponding to the Drier's discharge mouth (but not less than 600mm) and 5m long. The drive sprockets and chain should be fully enclosed in the guard. The front and rear sides near the pulleys should be properly guarded by bolting to the framework G.I gauge 22 plates of 1' (one foot) long.

Lighting:

The drying chamber and the dust extraction chambers are to be fitted with suitable sealed lights for inspection through the inspection windows.

Heat Exchanger:

The steam to air heat exchanger should be capable of raising air temperatures from 10 deg. C. to 150 deg. C.

To be aluminium finned steel tubing suitable for a maximum working pressure of 150 psig.

The fouling of finned surface not to exceed 15% for steady efficiency.

The tubing should be to AST 214 BS 3059/3 ERW. The fins keyed to the tube by grooving.

The casing to be galvanized and of 16 gauge thickness.

The steam flow to the head exchanger shall be automatically regulated to maintain the desired temperature in the plenum chamber.

Heat Exchanger shall have all the fittings to guarantee efficiency.

Each radiator bank to have an isolating valve in the steam line and full complement of strainer, Sensor chamber, trap, sight glass and non-return valve. The line should be free of any water hammer.

The Steam System:

The main steam line supplying to the radiator must be suitably sized to optimize on the required throughput. All the steam pipes used must be black heavy class "C" (BS 1387). All steam fittings must be *Spirax Sarco or Equivalent U.K.*

The three (3") inch diameter supply line must comprise of,

- a) An isolating valve- BAS2 Flanged bellow sealed valve DN80 c/w mating flanges
- b) Flanged iron strainer –0.8mm perforations, DN 80 C/W matching flanges.
- c) Steam separator, -DN 80 S13 Separator with SG iron body
- d) 6" pressure gauge with siphon 0-16 bar
- e) 1" steam trap set comprising
 - i. Isolating valve M10S2 FB DN 25
 - ii. SG IRON STRAINER –0.8mm perforations – DN 25.
 - iii. Steam trap FT14-10 DN 25.
 - iv. Spiratec sensor chamber- DN 25
 - v. Screwed disc check valve –LCV1- DN 25.

The steam supply to each radiator bank should have an isolating valve-HV3- DN 25 and the condensate drainage from each radiator should comprise an

- isolating valve,
- strainer,

- steam trap,
- sensor chamber
- and a check valve.

The system to incorporate a properly sized flash vessel to BS 4504; (with pressure release valve and pressure gauge) and complete with reticulation system to utilize heat from the Flash steam.

The downstream side of the flash vessel should have a suitably sized steam trap system comprising of;

- Isolating valve,
- strainer,
- steam trap,
- sensor chamber
- and check valve.
- 4” pressure gauge with siphon 0 – 6 bar

Main Fans:

These must be of high efficiency centrifugal fans of carbon steel and be able to generate the required airflow at static heads of 2” water OR as per the manufacturer’s design. Must be fitted with suitable dampers to regulate the airflow. They must be fitted with safety guards.

The noise level from the fans must not exceed 70 db. A test report from a reputable independent body such as KBS would be needed for noise level.

ELECTRICAL AND CONTROLS:

Motors

All motors to be standard and suitable for 415 volts 3 phase 50 Hz and have IP-54 level protection. They should have Class F insulation as per BS 2757

Electrical Control Panel:

To comprise of sturdy mild steel panel with separate MCB’s for all motor circuits control and lighting circuits.

To comprise of a sturdy, carbon steel panel with separate MCCB’s for all motor, control and lighting circuit.

Star Delta starters for each motor should be provided.

Panel lights must indicate ON/OFF/TRIP status for each motor.

All electrical wiring must withstand the dryer temperatures varying from 18 – 160°C.

The control panels should also incorporate power factor correction capacitors.

DRYER TEMPERATURE CHART RECORDER (THERMOGRAPH)

In order to **consistently** achieve the desired product quality parameter, it's imperative that the dryers are equipped with relevant instruments that will guide the Operators in the course of the dryer operation. It is for this reason, amongst others, that the Dryer be equipped with Temperature recorders with the following detailed specifications.

Specifications:

a) **Temperature Range:** 0 – 200⁰ C (Degrees Centigrade) with accuracy of +/- 1% FSD

b) **Chart Drive:** 24 Hour Electrically driven clock preferably with back-up battery. *Please provide Information detailing the drive set-up and maximum duration the chart drive can run on the back-up battery.*

Mechanically driven spring wound types should be given as an option and price stated separately.

c) **Power Supply:** 200 – 250 volts, 50Hz

d) **Pens and Inking:** Disposable fibre tipped dual Pens configured as follows:

Red Pen - Inlet Temperature

Green Pen - Exhaust temperature

Recorder to be supplied with 10 pairs of PENS.

e) **Bulb and Stem:**Stainless steel, preferably with diameter of 12.7mm.*Bulbs with diameters different than stated shall be considered.*

State the BS rating.

Bulb Lengths should be approximately 8” 200mm).

f) **Capillary:** Stainless steel tube **non mercury, non toxic.**
Filling medium.

Capillary length should be approx. 5 meters.

As an option state means of protecting the capillary, e.g. Flexible stainless Armour, etc

g) **Charts:** Disc type, size 9 – 11 inches diameter (229 – 279mm).

Each unit should be supplied complete with 100 charts.

h) **Case:** The chart should be properly encased with shatter proof clear glass window.

IP 55

i) **Mounting:** Preferably to be stand alone, free from vibration.

i) **Weight:** Approximately 7.0 Kg, *other weights within the same range but NOT over 10kgs shall be considered.*

k) **General:**

- Exhaustive technical literature should be provided in the Technical Proposal.
- Cost of the Thermograph should be stated separately.
- Warranties and other terms and conditions of supply should be covered in the financial proposal.
- Proposals should cover back-up services, required spares and technical capability to service and repair the instruments either on site or on 'Return-to base' basis.
- Sample of the Chart should be enclosed in the technical proposal envelope.

Drier control instruments

The dryer shall be equipped with 6” diameter Dial Thermometers to monitor the Inlet and Exhaust AIR temperatures in all the sections. The Thermometers should incorporate facilities to trigger both VISUAL and AUDIO alarms in order to alert dryer Operators in case temperatures fall below and rise beyond predetermined limits. The Thermometers are to be installed in each section i.e. wet end, and dry end; the temperature limits should be set to trigger the alarms as follows.

<u>Section</u>	<u>Inlet</u>	<u>Exhaust</u>
Wet end	High/low	High/low
Mid section	High/low	High/low
Dry end	High/low	High/low

(For any clarification please contact the Group Development Manager, OR the General Manager, Production.)

CAT LADDER

Dryer to have a suitably designed cat ladder and walk way for easy monitoring of the performance of the dryer

Attached data sheet (appendix II) should be filled wholly.

ELECTRICAL INSTALLATION

Supplier to allow for electrical installation of panel and dryer connection within 20m radii of the dryer

10. PRE-SORTER WITH FIBRE EXTRACTION ROLLERS (12”dia X 48” Long).

Capacity: 600kg/Hr

The support structure:

The support structure shall be made from 75mm x 75mm x 4mm RHS.

The vertical height of the dimple tray at the inlet (ball/cake extractor) shall be 1000mm high and the clean tea discharge chute end shall be 750mm high.

Tea Cakes/big balls extractor:

The extractor shall comprise of a hopper fitted with mesh No. 5 x gauge 18, all made from AISI stainless steel to ensure effective separation of cakes/balls from the tea. The hopper shall be connected to the pre-sorter vibro system and discharges the cakes/big balls in to a collection bin by side of the Pre-sorter.

Pre-sorter Tray:

The tray shall be made from 1.0mm AISI 304 stainless steel and shall have dimples suitably and evenly spaced throughout. The tray shall be about **180” by 48”**.

Attached along its length, are two common fibre collector chutes made of AISI 304 stainless steel of 1.0mm thickness for receiving fibre collected by the PVC roller fibre chutes. One (Top) of the chutes shall be inclined towards the direction of clean tea flow and shall have discharge openings equivalent to the number of fibre rollers on the chute but the remaining shall be discharged on to a recirculation conveyer(front). The openings shall discharge fibre into the lower chute inclined in the opposite direction of the flow of clean tea to discharge the fibre on a separate recirculation conveyer (rear).

The screen mesh for the clean tea discharge shall be of stainless steel, mesh 10 x gauge 22 measuring the full width of the pre-sorter and of minimum 30” in length.

AISI 304 Stainless steel Chutes shall collect the balls and discharged to the tea breaker/crasher which shall be provided separately. All necessary bolts, nuts, washers, screws and Engineering Felts must be provided for installation of the unit.

The clean tea discharge shall be from the centre of the Pre-sorter at the discharge end. Any alternative discharge position shall be approved by KALRO-TRI before manufacture.

The Crank (Vibratory drive)

The crank mechanism shall be driven via pulleys and belts, suitably sized and powered by 3 phase, 50Hz, AC motor so as to effect suitable crank mechanism throw of 25mm.

The fibre extractor rollers

The Pre-sorter rollers should be **12” in diameter by 48”** width and made from highly polished PVC material. Each pre-sorter should have six (6) PVC rollers fitted with

suitable steel shafts of min 1 ½” in diameter and mounted on vertically adjustable take-up bearings fixed on the support flap. The roller lowering mechanism should be such that the rollers can be lowered to within ½” of the tray and upwards to 4” of the same with ease.

The rollers shall driven chain and sprocket of minimum pitch 16mm (5/8“) by a suitably sized geared motor, 3 phase, 50Hz, AC. Engineering Felts Pressure Pads shall contact at a minimum of 25% of roller circumference and backed by hardwood timber support or equivalent. The sprockets and chains shall be fully enclosed in a guard. For each roller there shall be a fibre collector chute made from 1.5mm AISI 304 stainless steel and leading to the common top collector chute along the dimple tray.

600KG/HR – PRE-SORTER DATA SHEET

Item	Description	Manufacturers data/info
1.00	Pre-sorter make and origin	
2.00	Capacity of pre-sorter in Kg/hr	
2.00	Support structure materials and dimensions	
3.00	Pre-sorter tray size	
4.00	Single or double crank mechanism	
5.00	Bushing material used	
6.00	The number and size of the fibre extraction rollers provided.	
7.00	Is a common collector chute provided for the fine tea and fibres?	
8.00	No and size of motors in the pre-sorter	

11. VIBROSCREEN SORTERS- FINAL SORTERS

The decking and screens assembly components to be connected together by use of stainless steel quick release toggle clamps; other modes of connection clearly described and indicated on a drawing may be approved. The unit shall be capable of sorting up to 350 kgMT/hr. Effective diameter to be 1219mm (48”) with an overall height of about 1750mm.

Each deck (except the top most one) shall have **stainless steel, AISI 304, feed trays underneath screens** to guide the teas to the centre of each screen on the deck below. The top deck shall be provided with dust cover and the whole unit shall be supported on a fabricated steel base suitably designed for factory concrete floor mounting.

Each deck shall have a stainless steel screen mesh as specified below

<u>Deck</u>	<u>Mesh</u>	<u>Gauge</u>
A	No. 14	26
B	No. 24	29
C	No. 30	30
D	No. 40	32
E	No. 60	38

Alternate sets of meshes,

<u>Deck</u>	<u>Mesh</u>	<u>Gauge</u>
F	No. 26,	29
G	No. 32	30

DRIVE

The drive shall be assembled with a 3-phase suitably sized electric motor fitted with vibrations adjustment off balance masses.

Plenum chamber

The decks shall be mounted over the plenum chamber through vibratory coil springs. The plenum chamber shall be fitted with an inspection door for ease of drive maintenance and cleaning.

TECHNICAL DATA SHEET

In addition you are required to fill in the specifications below.

Item	Specifications	
1	Vibratory sorter make and origin.	
2	Mesh No and Gauge for Deck A	
3	Mesh No. and Gauge for Deck B	
4	Mesh No. and gauge for Deck C	
5	Mesh No and gauge for Deck D	
6	Mesh No, and gauge for Deck E	
7	Motor make and origin	
8	Feed trays provided –Yes/no	
9	Motor rating	
10	Warranty period	

12. WINNOWING MACHINE COMPLETE WITH COTTON CANVAS BELT CONVEYOR 457MM (18'') AND TEA RETAINING HOPPER FOR WINNOWER FEED.

Winnowing machine

The winnower body - sides, top and bottom- shall be constructed from a suitably reinforced (from the external) 1.5mm stainless steel, AISI 304. The unit shall be sturdy, well-constructed and comprising of sorting section and an expansion chamber. Low compartment separating sides, will taper towards at least five (5) individual sliding doors. At least 3 Nos. equi-spaced and strongly hinged mild steel framed Perspex inspection window. The interior shall be provided with lighting for observation. Winnowing shall be performed by a paddle bladed flow fan driven by suitable 415 volts, 50Hz AC motor. An adjustable multi-vane damper shall be provided at feed end with externally adjusting device. The unit shall be efficiently able to separate powder and fluff from tea. Supply should include collection bags for powder.

Winnower feed hopper:

The Hopper shall be made from 1.5mm stainless steel, AISI 304, sheeting with hopper base and supporting members made from top (926mm x 926mm x 762mm) but tapering thereafter (102mm x 102mm) to match the size of the discharge apertures. It shall have an overall height of 1450mm and the height from the ground and adjustable discharge aperture of 600mm width.

13. WINNOWER FEED CONVEYOR

CONVEYOR FRAMEWORKS

The conveyor framework shall be made from **30mm x 30mm x 3mm** thick RHS.

DRUM ROLLERS

The drum rollers shall be of diameter 6". **Both Pulleys should be fabricated in a way to allow assembly and disassembly while fitting and removal of the endless belt.** A belt tensioning mechanism at **both ends** of the conveyor shall be provided. The pulley shaft shall have a diameter of 1 1/2".

MOTORS

All motors shall be EFF2, suitably sized, IP55, 3 phase, and 415 volts. The motors should be *Bonfiglioli* or equivalent.

THE HEADER PULLEY

The header pulley shall be chain driven by a suitably sized geared motor as specified above so as to effect a belt speed of 27m/min (90ft/min). The chain size should be 3/4". The idle roller shall be 2 1/2" in diameter and running freely in sealed ball bearings. The

spacing between the rollers should not be more than two metres. These rollers should be fitted on the conveyor frame by upright stiffeners or separate brackets.

SKID PLATE

The skid plate shall be made from of 1.5mm Galvanized sheet metal fitted perfectly flat and bent over the full length of RHS to form a trough type bed. **The depth between the skid plate and the upper framework shall be 3” (75mm).**

CONVEYOR GUARDING

The conveyor shall be covered fully along its entire vertical sides with **1.5mm G.I. sheet** as shown on the drawing provided. The lengths of the guards should be in sections of 2m each where possible. The guards should be secured by means of bolts and nuts. The open rotating shafts (bearing) and the rear drum should be fully guarded using expanded metal.

REAR CHUTE, FRONT CHUTE AND SIDE SCRAPPERS FOR CONVEYORS

The Rear of the belt shall have a guide chute with side guide scrappers to prevent spillage getting into the drums. The front discharge shall have cleaning brush. The guide chutes shall be made from AISI 304, 1.5mm.

Cotton canvass belt conveyor.

The belt is intended for use in conveying **MADE TEA** with moisture content ranging from 2.8% to 5%.

- ❖ **BELT TYPE:** Cotton Canvass belt
- ❖ **Drive mechanism.** Chain driven roller – off a geared Motor.
- ❖ **General specifications.**
- ❖ **Quality:** Must be **food quality.** (Proof of FDA certification required)
- ❖ **Material:** Uncoated Cotton.
- ❖ **Colour:** Natural (Off-White).
- ❖ **Surface:** Cotton with Low roughness to inhibit product ingress.
- ❖ **Thickness:** 3 to 3.5mm.
- ❖ **Belt construction:** Two (2) ply.
- ❖ **Max admissible belt tension:** >21N/mm
- ❖ **Operating Temperature:** >90°C
- ❖ **Joining:** Overlap or P.V.C film.
- ❖ **Belt Width:** 18”
- ❖ **Length** 6 m

See details for cotton conveyor to be provided by KALRO-TRI Engineers

14. BULKING BINS 1829MM X 1829MM (6FT X 6FT)

Bin size.

The bins shall be constructed from 1.5mm AISI 304 stainless steel sheeting, riveted or properly welded to the supporting frame. The size of the bin shall be 1829mm x 1829mm x 2780mm. Its volume shall be 6.88m³

Construction

The vertical sides shall be 1687mm while the remaining 1103mm is to taper evenly on all sides to a 305mm square discharge opening. The bins shall have four compartments internally partitioned with 1.5mm AISI 304 stainless steel panels. The vertical and horizontal sides shall be reinforced with 50mm x 50mm x 6mm angle iron. The corners of the tapering portion shall be reinforced with 30mm x 30mm x 4mm angle iron while the vertical portion should have reinforcement 50mm x 3mm mild steel flats.

- **Inlet and discharge doors**

The inlet trap door shall be made from **2mm AISI 304 stainless steel**. A provision shall be made to make it lockable as shown on the drawing provided.

The bin discharge doors shall slide along a fabricated guide. It shall be made from **2mm AISI 304 stainless steel**. A provision shall be made to make it lockable.

Note: All the parts getting in to contact with tea shall be made of AISI 304 stainless steel material.

- **Ladders and catwalk**

The bins shall be fitted with **two strong ladders** with handrails at the end most bins to access the top of the bins.

A **catwalk** with at least 3mm well supported chequered plate base and strong handrail running along the edge of entire length of the bins shall be provided.

The external surface of the supports should be finish-painted over a primer with white paint. All Anchorage bolts, strengthening bracings nuts and washers shall be provided.

For further details see drawing provided.

15. VERTICAL BUCKET ELEVATOR 305MM (12 IN) FOR BIN FEED:

The capacity: shall not be less than 1,500 kgsMT/hr

This Conveyor will receive sorted tea and deliver the same into the bulking bins. It will have vertical tower housing complete with the belt, buckets, drive pulleys and made from 2.0mm stainless sheet reinforced at joints and tower's vertical edges with 46mm x 46mm x 3mm (1 3/4" x 1 3/4" x 1/8") angle iron. The front and side of the tower housing shall have at least 2 Nos. clear inspection windows made of Perspex. The bucket elevator shall be free of tea leakages including the fine grades

The tower base platform shall be fabricated from mild steel angle iron, steel plates and the feed hopper shall be AISI 304 x 1.5mm stainless steel sheeting complete with an adjustable feed door, for regulating the feed.

The elevator housing shall be of 1.5 mm AISI 304 stainless steel and shall be fitted with a spy door at the bottom for cleaning to avoid teas being mixed with the wrong particle sizes.

The entire Elevator will run on two parallel rails running along the sides of the bulking bins, hence the length of the 2 rails shall be determined by the numbers of the bulking bins. The rails shall in turn be supported on brackets welded on to the bulking bins framework.

The elevator's drive shall be through pulleys of 381mm (15") diameter, the header pulley being directly driven by a suitably sized 3 phase, 50 Hz AC geared motor so as to provide belt speed of between 45 – 60 rpm.

The belt should be food quality, cotton canvass, endless, and of 3 ply construction. The buckets shall be of AISI 304 stainless steel effectively secured onto the conveyor belt.

A belt tensioning mechanism at both ends of the conveyor should be provided and of not less than 20 mm diameter rod and not less than 300 mm allowance. The pulley shaft should have a diameter of 1 1/2".

The elevator during the feeding of the teas shall move smoothly without obstructions and abnormal noises.

The design of the discharge chute of the bucket elevator shall provide for individual bulking of teas into every bin's compartments.

Reinforcements and supports will be required to be finish painted in White paint over a primer.

Note: All the parts getting in to contact with tea shall be made of AISI 304 stainless steel material.

For further details see drawing provided

16. COTTON CANVAS BELT CONVEYOR 610MM (24 INCHES) FOR BIN DISCHARGE:

The conveyor framework should be made from 30mm x 30mm x 3mm thick RHS.

Drum Rollers.

The pulleys should be of diameter 178mm (7"). The tail pulley should allow for easy fitting and removal of the endless belt. A belt tensioning mechanism at both ends of the conveyor should be provided. The pulley shaft should have a diameter of 1 ½".

The header pulley

To be chain driven by a suitably sized geared motor, 3 phase, 50hz. So as to effect a belt speed of 27m/min (90ft/min). Motor should be of heavy-duty type. The idle roller to be 2 ½" in diameter and running freely in sealed ball bearings. These rollers should be fitted on the conveyor frame by upright stiffeners or separate brackets.

Skid plate.

The skid plate should be made from of 22 gauge galvanized sheet metal fitted perfectly flat and bent over the full length of RHS to form a trough type bed

Conveyor guarding

The conveyor should be covered fully along its entire vertical sides with 1.5mm G.I. sheet as shown on the drawing provided. The open rotating shafts (bearing) and the rear drum should be fully guarded using expanded metal. The lengths of the guards should be in sections of 2m each where possible. The guards should be secured by means of bolts and nuts.

Cotton canvass belt

Application

The belt is intended for use in conveying **MADE TEA** with moisture content ranging from 2.8% to 5%.

- ❖ **BELT TYPE:** Cotton Canvass belt
- ❖ **Drive mechanism.** Chain driven roller – off a geared Motor.

General specifications

- ❖ **Quality:** Must be **food quality**. (Proof of FDA certification required)
- ❖ **Material:** Uncoated Cotton.
- ❖ **Colour:** Natural (Off-White).
- ❖ **Surface:** Cotton with Low roughness to inhibit product ingress.

- ❖ **Thickness:** 3 to 3.5mm.
- ❖ **Belt construction:** Two (2) ply.
- ❖ **Max admissible belt tension:** >21N/mm
- ❖ **Operating Temperature:** >90°C
- ❖ **Joining:** Overlap or P.V.C film.
- ❖ **Belt Width:** 610mm (24””””)

Additionally the following should be provided.

- ❖ Provide adjustable **Nylon brush** pressing on the return belt at discharge end so as to effectively brush off adhered teas off the belt.
- ❖ Install **Top sheet** cover along the entire conveyor length complete with a **removable collection tray** at the far end.
- ❖ Motor speed 54 rpm.
- ❖ Provide conveyors stands.
- ❖ Provide **24” bar magnet**.
- ❖ Length of conveyor will be **20.5m**
- ❖ The Conveyor will be centrally placed beneath the bulking discharge doors.

The last 2m of the conveyor will be raised slightly to discharge on to the packer feed conveyor.

The length between header pulley and tail pulley shafts centre-lines will be **20 meters**.

17. TEA PACKER COMPLETE WITH FORMING BOX.

To be made of structurally strong mild steel table of 10 mm thick, steel chassis with efficient shock proof pads and suspension springs, mounting base plate and the vibrator mechanism (crank type) driven by a suitably sized, 3 phase, 50 Hz, AC, motor with its mountings either bolted to the inside of the chassis frame, or forming an integral part of separate vibrator drive mechanism. The motor final pulley output should be 900 rpm. All crank shaft journals to have pre-packed bearings (silent block type). To be capable of speedily compacting two large forming boxes within the weight range of 150 kg giving a total weight on compaction to be 300kg. The necessary anchorage bolts, nuts and washers to be provided. Certain parts of the unit to be finish-painted over a primer with an approved colour paint to be specified and notified during manufacture.

Paper sack forming box for tea packing:

The Paper Sack Forming Box must have internal dimensions of 44” x 22” x 8” so as to facilitate accurate accommodation of Paper Sack without creasing or deforming.

The Form Box should be fabricated either from thin gauge stainless steel 1.5mm. The maximum weight of the form box should not exceed 25kg.

The form box must incorporate a Quick Release locking mechanism.

18. COTTON CANVAS BELT CONVEYOR 610MM (18") FOR PACKER FEED.

As item 18 above but with the following additional requirement.

In addition to two adjustable nylon brushes pressing on the return belt at discharge end, a **bar magnet** will be fitted above the delivery belt at this end.

Length between header pulley shaft centre line and tail pulley shaft centreline to be **6m**, The conveyor frame, supporting structure and bracings will be in accordance with the drawing(s) supplied.

19. TEA PACKER RETAINING HOPPER:

To be fabricated from 1.5mm stainless steel sheeting, to have dimensions indicated on the drawing and to be supported on 50mm x 50mm x 3mm R.H.S frame. Bracings of similar size as the supports to be provided and fixed to end support. The upper section of the hopper to have 300mm (12") vertical sides from hopper top, with the remaining hopper lower section tapering evenly on all sides to form two 150mm square openings resultant from halving the tapered hopper portions as indicated on the Drawing provided. Discharge doors (horizontally sliding) as indicated to be provided. Overall unit height from floor level should be minimum **2.7m**

20. ROLLER CONVEYOR 460MM X 918MM LONG FOR PACKED TEA SACKS:

The steel Rollers will be about 64mm (2½ in) diameter, 102mm (4 in) pitch and 457 (18 in) effective width/length. They will be fitted with free running sealed ball bearings and their shafts will be mounted on the 38mm x 38mm x 3mm (1½ in x 1½ in x ¼ in) angle iron top frame. Bottom frame will be of similar size for both Conveyors. The two Conveyors will have lengths indicated on the drawing(s) and both will be free standing. Short pieces of similar sized angle iron will be welded at equal centres to top and bottom frame for strengthening purposes.

21. HYDRAULIC LIFTING PLATFORM 3000 KGS- FOR PALLETISED TEA

The hydraulic power unit should drive the platform.

It should have a lifting capacity of approximately 3 tons able to lift palletised tea to a height of **at least 2 metres while the moving scissor support member does travel beyond the half mark of the platform length.**

It should have a reinforced, waterproof top frame with overall dimension of 2.5 metres by 3 metres.

It should have suitably placed electrical switch to control upward/downward movement. The hydraulic ram should be made of hard chromed shafts. A pair of scissor type supports should supplement it.

The platform should be supplied complete with a suitably sized, 3 phase, 50hz AC motor to drive the power unit. It should have all the necessary protection.

The platform should be flush with the floor level to allow handling of manual pallet truck.

The platform should have both hydraulic and electric safety switches.

22. DUAL FIRED STEAM BOILER- 4545 KG/HR ON WOOD 8000KG ON OIL

SCOPE

The scope shall be to Supply, install and commission one steam boiler at a TRFK Managed Tea Factory with the following specifications.

Technical Specifications:

Type:

Three pass Wet back, Horizontal shell, fire tube **fully packaged unit**, made to B.S 2790 latest edition, and designed for using both furnace oil and fire wood as fuel. Provide for a heat exchanger for combustion air pre-heating to 120°C. The feed water pump, induced draught and forced draught fans shall be provided with a variable speed drive for automatic speed control using the water level and boiler steam pressure for the input signal respectively. The package should incorporate an electrical control panel with both manual and auto control facilities.

Capacity:

4545kg/hr (10,000lb/hr) F & A 100°C when **wood fired** at an altitude of 2000 metres.
8000kg/hr (17,630lb/hr) F & A when **oil fired** at an altitude of 2000 metres above sea level.

Working Pressure:	-	150 PSIG.
Design Pressure:	-	157.5 PSIG.
Fuel:	(a) Oil	- 1500 Secs RE – 1 at 82°C
	(b) Firewood	- 3580K.Cal/kg (6500Btu/lb)

Burner and Controls

The Burner should be Saacke Rotary cup type, fully modulating, fully automatic complete with a forced draught fan.

Output: - 8000kg/hr at F & A 100°C

Fuel Consumption: - Approx. 510kg/hr

Boiler Efficiency on net calorific Value of fuel, Not less than:

85% when oil fired and,

80% when wood fired.

The attached technical data sheet shall be filled wholly. (Appendix III)

Quality:

The Boiler manufacturer must be ASME certified. Copy of certification must be attached.

General Boiler Design:**Plates:**

Carbon Steel Plate made to BS 1501 – 430A must be used and full certification and chemical analysis to be provided.

Shell:

The boiler shell is cylindrical and should comprise of specified plates with welded seams. The tube plates will be inset and welded to the boiler shell. Stay bars and washers will be fitted between and welded to the tube plates.

Furnace:

The boiler will be fitted with one furnace tube attached to the front tube plate and the combustion chamber tube plate by welding.

The furnace must incorporate at least 4 bowling hoop sections.

Combustion Chamber:

The combustion chamber will be fully submerged and comprises of a wrapper plate with welded seam. The tube plate and endplate will be fitted between and welded into the end plate and the boiler rear tube plate thus forming the “Wet Back”.

Tubes:

Tubes are to be seamless hot rolled steel to BS 3059 Part 1 Grade 320 and should be minimum of 38.1mm outside diameter.

Second pass tubes are to be fitted between the front tube plate and the combustion chamber tube plates of the boiler shell.

Plain tubes will be expanded, and the stay tubes expanded and welded into the tube plates. All second pass tube ends in the combustion chamber are to be finished, flushed and welded in with a “J” preparation.

Seating:

Pads and standpipes are to be welded to the shell for connection of steam and water mounting, water level controls, safety valves, blowdown valve and the air vent.

A 25mm blanked pad is to be fitted to the side of the shell, which can be used for chemical dosing, automatic blowdown probe or water sampling.

Access:

The boilers must be fitted with a 420mm x 320mm manhole at the top of the shell and two manholes at the bottom of the shell.

Fireside:

An access tube minimum inside diameter of 432mm is to be fitted and welded to the combustion chamber endplate and the shell rear tube plate. A hinged access door is to be fitted with refraction plug and incorporating a flame sight glass assembly.

Platform Cleats:

Cleats should be welded to the boiler shell for the attachment of an access platform.

Non-Destructive Examination:

Testing of welds is to be carried out as follows by radiographic or ultrasonic technique.

Shell: Longitudinal Seam	-	100%
Circumferential Seam	-	10%
Tee Junction of Longitudinal and Circumferential Seam	-	100%
Shell Plate to End Plate	-	10%
Furnace: Longitudinal Seam	-	100%
Furnace to Combustion Chamber and End Plate	-	25%

Tee Junction of Longitudinal and Circumferential Seam	-	10%
Combustion Longitudinal Seam	-	10%
Chamber Endplates to Wrapper	-	10%
Access Tube Longitudinal Seam	-	10%
Access Tube to Combustion Chamber and Boiler Endplate	-	10%

In addition, magnetic particles or dye penetration examination is required for detection of surface defects on the following: -

Shell to End Plate	-	10%
Furnace to End Plate	-	10%

Heat Treatment:

On completion of welding, the boiler shell is to be stress relieved. The heat treatment curve/graphs shall be submitted to TRFK along with the boiler folder

Hydraulic Test:

On completion of tubing, the boiler is to be subjected to a hydraulic test to a pressure of 1.5 times the boiler design pressure in the presence of the Insurance Company Surveyor. The pressure testing certificate shall be submitted to TRFK along with the boiler folder.

Furnace Closing Plate:

A closing plate is to be welded to the front end of the furnace for the attachment of the firing equipment.

Front Smoke Box:

A mild steel smoke box with bolted access doors is to be welded to the front tube plate of the shell insulated with suitable refractory material on the inside surface so as to give an outside temperature of not more than 50°C. The door shall be properly hinged for ease of opening.

Rear Outlet Box:

A mild steel outlet box fitted with lift-off bolted access doors is to be welded to the rear tube plate of the shell. A horizontal circular flagged outlet connection is to be fitted to this box.

Base:

A mild steel base designed to BS 2790 Appendix F for supporting the boiler and even distribution of the total weight through the main cross members. The base framework consists of four (4) vertical legs welded to wear plates, which in turn are to be welded to

the shell. Horizontal sections at ground level are to be welded to the vertical legs. Each vertical leg should have a jacking point to assist in positioning of the boiler on site.

Insulation:

The external surface of the boiler shell and the periphery of the front Smoke Box are to be insulated with min 75mm thick mineral wool/Rockwool slabs securely fixed and clad in min 0.8mm stainless steel so as to achieve surface temperatures of not more than 30°c.

Mounting:

The boiler is to be fitted with a full set of steam and water mountings comprising of the following and in accordance with BS 6759.

Safety Valve:

Double spring high lift type with polymeric sealing.

- Body - SG Iron
- Trim - High Grade Nickel Alloy.
- Spindle - in Stainless Steel

Valve to **be flanged Ari armaturen or equivalent** complete with drain boss and should be safe to operate at boiler design pressure..

Main Steam Stop Valve; start up valve (air vent)

Main steam stop Valve to **be flanged Ari armaturen crown valve or equivalent angle pattern** and the start valve to be flanged *Ari armaturen* or equivalent.

- Body - SG Iron
- Seals and Valve Head - High Grade Nickel Alloy
- Stem - Aluminium Bronze.

Feed water valves

a) Feed Check Valve:

Valve to be flanged Disc Check Valve (DCV) type.

- Body - Austenitic stainless steel
- Seats and Valve Head - Austenitic stainless steel

b) Stop valves

The valves shall be flanged 5no., 4 for inlet and outlet of each feed pump and 1 for the boiler inlet and of the following materials.

- Body - SG Iron
- Seals and Valve Head - High Grade Nickel Alloy
- Stem - Aluminium Bronze

Blowdown Valve:

Blowdown Valve shall be supplied complete with key. It shall be the parallel slide key operated type with rack and pinion mechanism.

Body	-	Bronze
Seats	-	High Grade Nickel Alloy
Rack	-	Gun Metal
Pinion	-	Aluminium Bronze

1 No. Mild Steel box type operating key is required.

Water Level Indication:

Two (2) sets of water gauges are required.

Materials	-	Bronze.
Sleeve Packing	-	Heat resistant PTFE
Gauge Glass packing	-	Heat resistant Rubber
Glasses	-	<i>Vident</i> or equivalent

Should have the drain siphon made of bronze material with sleeve packed cocks – quick opening type.

Two (2) sets gauge glass protectors comprising bronze frame and toughened plated glass fitted to three (3) sides of each protector.

2 pointers to be used to set water level limits.

Level Controls:

Water level controls and alarms are to be fitted as follows: -

- i. Provide Dual level control arrangement to cut out the Burner and give an alarm at First Low Water Level and also to control the feed pump operations.
- ii. Provide Single control arrangement to lock out the Burner and give alarm at Second Low Water Level.

The water level controls to be mounted on a Cast Iron Chamber. Switch Heads are to be mounted in housing comprising a die cast base with a Zinc-coated Mild Steel casing. Two electrical cable entries of 25mm diameter should be provided. Switch units should have single pole double throw contacts and self-holding. The units are located on vertical support rods adjacent to the centre tube. Positioning should be by clamp screw.

The centre tube should be made from non-magnetic stainless steel and expanded into the top cover flange. It should be fitted with a Stop Cap that also acts as a guide for the float rod.

The float should be manufactured from monel metal and the float rod in stainless steel. Each control must be fitted with a sequencing blow-down valve to provide positive purging of the water connection, float chamber and steam connection.

Pressure Switches/gauges:

a) Pressure gauge

Provide One (1) Pressure Gauge of the Bourdon Tube type with metal case and Glass window. Internal mechanism made from non-ferrous material.

Provide a Siphon made of bronze material with sleeve packed cocks.

b) Pressure switches

Provide Two Nos. Pressure Switches as follows: -

- 1- For Cutting Off the Burner in case of Excess Pressure and;

- 1- For Modulation of Burner.

Desired pressure should be set as per requirement - adjustable.

Provide a Siphon made of bronze material with sleeve packed cocks.

Catwalk

Catwalks should be provided with the boiler so as to be able to access the Mobrey switches, blow down valves, steam stop valve, steam safety valves, air vent and manhole. Ladder and Handrail should also be incorporated with the catwalk which must be adequate to accommodate two persons.

Drains:

Drains from the water gauges and level controls are to be connected through a copper drain. It is to run separately and terminate with an open connection to the drain header.
The

Tools and Spares:

The following are to be provided with each boiler:

I	Description	Quantities
1.	spanner for Man-ways	1
2.	set of Man-way joints	1 set
3.	water gauge Glasses	2
4.	Packing Rings and Cones for Gauges	4 sets
5.	Mobley air break switch	2 sets
6.	Pressure gauge (steam),	1
7.	Pressure switch (steam),	1
8.	Pressure gauge (fuel).	1
9.	Overload relay for water pump,	1
10.	Thermometer for fuel line	1
11.	Over relay for FD Fan,	1
12.	Overload relay for ID,	1
13.	Bearing for FD fan,	1 set
14.	Bearing for ID Fan,	1 set
15.	Electrodes,	2 sets
16.	Tube cleaning brushes.	4

Drawings:

Two copies of the Boiler General Arrangement drawings and Electrical wiring diagrams to be provided

Operating Instructions

One set of Operating and Maintenance Instructions are to be provided.

Electrical Wiring:

Heat resistant cables to be used for wiring the Burner, Level Controls and the Feed Pump Motor to the Control Panel. Wiring between the Mains and the Control Panel is to be excluded.

Flue gas exhaust duct:

A suitably sized piece of ducting immediate to the flue gases outlet, with flanged ends and incorporating an expansion joint and hand-operated damper is to be provided. Both the outlet duct and chimney (Stack) should be provided. 5mm Blanking for fuel oil and firewood flue system should be provided. The chimney should install complete with the cap with a smoke deflector. The chimney should be suitably sized and the height will be **24m metres**. Allowance should be made for **3 no.** suitably sized guy wires to support the chimney to the ground. A detailed foundation design details shall be provided to TRFK by the successive bidder to facilitate civil works. A cat ladder shall also be provided on the chimney. The chimney to be assembled on flanged sections of **4.88 metres** each.

Combustion Air Preheater

The combustion air preheater shall be provided with heat exchanger for pre-heating the combustion air to 120°C from ambient temperature of about 25°C.

The heat exchanger tubes shall be seamless hot rolled steel to BS 3059 Part 1 Grade 320 and should be minimum of 38.1 mm outside diameter.

b. Spark Arrestors

Suitably sized and designed spark arrestors should be provided in the flue gas duct. The spark arrestor shall be efficient enough to ensure all charcoal particles are arrested within it.

Fuel Oil Line:

Boiler feed fuel line to be fitted with a high quality fuel meter able to continually meter fuel consumption by the boiler.

Painting:

On completion the boiler is to be cleaned and painted one undercoat and one top coat in the following colours: -

Boiler Shell	-	Black
Screen Plates	-	Grey
Base, Outlet Box and Access Doors	-	Black
Installation cladding	-	Stainless Steel

The burner, panel pump and fittings may be supplied in manufacturer's standard colours.

Control Panel:

A suitable control panel is to be fitted to the boiler side and to house all control equipment, starter, fuses and mains isolating switch to the following specifications:

Main Supply:	415V/3 Phase/50Hz
Control Supply:	240V/50Hz
Enclosure:	600mm High x 600mm x 200mm Deep
Protective Category:	IP 55
Finish:	Light Grey

Mounted within the enclosure should be: -

- 1 - To isolate mechanically interlocked with the enclosure door.
- 1 - Star-Delta Starter complete with under voltage and thermal overload protection.
- 2 - Sets of Motor Fuses.
 - 1 - Set Control Fuses.
 - 2 - Plug-control Fuses
 - 1 - Set of outgoing terminals

Mounted on the enclosure door should be: -

- Isolator Handle suitable for padlocking in the OFF position.
- Pump Handle suitable for padlocking in the OFF position.
- Water Level Reset Push Button.
- Set of Transformer-Operated Indicators to show all Boiler functions.
- Alarm Bell.
- Alarm Horn (Klaxon).
- Set of labels.
- Pressure Switches to cut off and modulation of Burner.

The Alarm Bells are to be mounted on the panel.

MOTORS

All motors should be high efficiency energy saving type determined in accordance with IEC 60-034-20

Feed Water Pump:

Two electrically driven vertical multistage feed water pumps will be supplied and fitted to the boiler base frame complete with flange-mounted motors British Standards 3979. The make of the Pumps should be *Grundfos* or equivalent. The pumps shall be capable of pumping 10m³ at 120 meter head.

Material Specification:

<i>Stainless Steel:</i>	Impellers, Intermediate Chambers Guide, Spring Coupling Guard,
Outer Sleeve:	Shaft Lockout Nut, Pump Shaft.
<i>Cast Iron:</i>	Pump Housing, Pump Head and Coupling.
<i>Tungsten Carbide:</i>	Shaft Bearing, Shaft Seal Faces.
<i>Ceramic:</i>	Intermediate Bearing.
PTFE:	Impeller Neck Ring.
Unillion:	Outer Sleeve Gasket.
Viton:	Bellows, Shaft Seal 'O' Ring.

Combustion Equipment:**Oil Burner**

A fully automatic high efficiency rotary cup burner capable of operating at excess air lower than 17% should be provided with boiler.

The unit must be correctly sized to achieve required boiler output and should be capable of burning heavy oil having general specification as follows: -

1. Minimum GCV - 42.0 MJ/kg
2. Moisture content - less than 0.1%
3. Sulphur content - Max 2.5%
4. Maximum Kinematic viscosity - 85 Centistokes.

- 5. Flash point - 85°C
- 6. Density - 0.97 kg/l

The unit should be complete with burner management systems and all the functions should be visible on control panel mimic fascia.

The Burner Control Panel should be complete with Electronic Temperature Controller, Boiler Sequence Controller Ignition Transformer, Oil Pre-heater, Air Damper Motor, Flame Surveillance System and Solenoid Valves.

The firing rate should be controlled automatically by modulating damper motor in accordance with boiler load, and should maintain same efficiency throughout the modulating range.

The burner should be freely accessible for easy maintenance with minimum removal of oil pipe work and electrical wiring.

The burner must be provided with air inlet silencer to reduce noise.

A complementary oil pre-heater, electric and steam complete with thermostatic control units should be provided for heating oil to a pre-determined temperature before it reaches the burner.

Wood Fired Furnace

A hand fired stationery grate consisting of front plate, side protection and top arch castings, front and rear bearers, stationery grate bars with sidebars and fixing cleats together with a poker and rake.

The unit must be correctly sized to ensure boiler designed steam output is achieved and is based on the following general requirements for the fuel wood.

Minimum Gross CV of 15158 kJ/kg (6500 BTU/lb)

Maximum Moisture Content of 30%.

Maximum Billet Size of 50cm length x 15cm diameter.

The ID fan must be correctly sized to provide adequate air for efficient combustion.

The front plate should be specifically designed to match the furnace flue features and refractory sealing should be provided between this and the arch castings. It is important that the side hinged fire doors include a facility to admit secondary air to allow the burning off of any volatile gases released from the ignited fuel.

Fire bars

Fire bars should be maximum 24" long, narrow section deep fin design cast in high-grade iron alloy. This eliminates the possibility of distortion due to overheating.

OIL LINE HEATER AND RING MAIN

One complete ring main for two-boiler house installation shall be provided. The Ring main will consist of,

1. Pump unit complete with geared pump suitably sized c/w strainers, valves, gauges, on-line cleaning filter, manifold and fittings. The above will be mounted on a common base frame complete with a drip tray.
2. Suitably sized steam and electric heater set with temperature control, isolation and bypass valves mounted on a frame.
3. 40 Metres in length of ring main (piping) suitably sized with takeoff points insulated and cladded.
4. Electrical switchgear and controls for the above equipment.
5. One off backpressure valve with isolating and by passes valves.

The following must be supplied with the Boiler: -

1	General Arrangement Drawing.
2	Chimney foundation design details
3	Electric Wiring Diagram.
4	Manufacturer's Inspection and Test Certificates.
5	Installation and Commissioning instructions manuals,
6	Operating and Maintenance Manuals.
7	Priced List of critical Spares.
8	All tools, necessary for day-to-day operations including tube cleaning brushes.
10	Warranty certificate.

INSURANCE SURVEYS:

Design of the Boiler and construction drawings are to be checked and approved by Insurance Company in conjunction with KALRO-TRI Engineers. The Insurance Company and KALRO-TRI Engineers must carry out a class 'B' survey during the construction of the Boiler.

WARRANTIES

All equipment are to be guaranteed against defects in material and or workmanship for a period of 12months from the date of commissioning.

INSTALLATION, COMMISSIONING AND TRAINING

The boiler supplier will carry out the installation of the boiler and all its accessories including flue gas ducts and stack (chimney) after it has been positioned. The boiler supplier shall also provide a commissioning Engineer for commissioning the boiler and training the boiler users on operation and maintenance at no additional cost.

During commissioning the supplier ensure the efficiency of the boiler is achieved as per BS 854 Part 1. The supplier shall also conduct a steam test to confirm the output of boiler as per stated parameters and test all the safety functions of the boiler.

COMMISSIONING REPORT:

The supplier shall **develop** and issue to TRFK a qualification report format that shall be submitted to TRFK for review before the shipping of the boiler. The agreed Operation and qualification report format will be used when commissioning the boiler.

Submittal Data

Test certificates for all equipments and accessories fitted on the boiler must be submitted to TRFK together with the operation and installation qualification report format.

Quotation

The Bidder should quote a lump sum price of the Boiler CIF Mombasa, and for installation and commissioning of the boiler (inclusive of commissioning Engineer's charges; airfare, accommodation, travel to site etc). The supplier will offer free operation training on maintenance and operation. TRFK shall clear and transport the boiler to site.

The technical data sheet below must be filled by the boiler bidders.

Item	Description Minimum		Manufacturer's Data
1	Maximum Output @ 100°C f & a a) When Wood fired b) When Oil fired	kg/h kg/h	
2	Fuel Type and Class a) Wood (GCV) b) Oil (GCV Redwood No. 1 @ 100°F)	kcal/kg kcal/kg	
3	Design Pressure a) Operating Pressure b) Safety Valve Lift Pressure	kPa or Bars kPa or Bars	
4	Efficiency on NCV a) Wood b) Oil	% %	
5	Minimum Calorific Value of Fuel a) Wood (GCV) b) Oil (GCV)	kcal/kg kcal/kg	
6	Mode of Firing a) Mode of Control b) Wood c) Oil		Hand fired Steam pressure controlled Fully automatic

7	<ul style="list-style-type: none"> ▪ Maximum Moisture Content in Fuel <p>Wood Oil</p>	% %	
8	<ul style="list-style-type: none"> ▪ Code of Design <p>Design Approval</p>		BS2790 Lloyds Register
9	<ul style="list-style-type: none"> ▪ Material for Construction a) Shell b) Tube 		BS1501 – 151 – 430A or B BS3059
10	<ul style="list-style-type: none"> ▪ Heating Surface Area (a).Furnace (First Pass) (b). Flue Tube (Second Pass) (c).Flue Tube (Third Pass) (d). Air Pre-Heater 	m ² m ² m ² m ²	
11	<ul style="list-style-type: none"> ▪ Draught in Furnace 	mmWg	
12	<ul style="list-style-type: none"> ▪ Pressure Drop on Flue Gas (a) Boiler (b) Smoke Chamber (c) Ducting (d) Air Pre-Heater 	mmWg mmWg mmWg mmWg	
13	<ul style="list-style-type: none"> ▪ Temperature Profile on Flue Gas (a) Furnace Exit (b) Flue Tube Exit (c) Air Pre-Heater Exit (d) Hot Air (Combustion air) 	°C °C °C °C	
14	<ul style="list-style-type: none"> ▪ Velocity Profile of Flue Gas (a) Furnace (b) Flue Tubes (c) Ducting 	m/s m/s m/s	
15	<ul style="list-style-type: none"> ▪ Design Data (a) Shell Diameter/Length/Thickness (b) Furnace Dia. /Length/Thickness (c) Combustion Chamber Dia./Length/Thickness (d) 2nd Pass Tubes Outer Diameter/Nos (e) 3rd Pass Tubes Outer Diameter/Nos (f) Furnace Volume (g) Water Volume(Flooded) (h) Steam output Volume (i) Total Heating Surface area (j) Grate Length/Width/Area 	mm mm mm mm mm m ³ m ³ m ³ m ² m ²	
16	<ul style="list-style-type: none"> ▪ Non Destructive Testing Done: 		

	<p>On Shell</p> <p>a) Longitudinal b) Circumferential c) Tee Joints d) Shell Plate to End Plate</p> <p>On Furnace</p> <p>a) Longitudinal b) Furnace to Combustion Chamber c) Tee Joint</p> <p>▪ Access Tube</p> <p>a) Longitudinal Seam b) Access Tube to Combustion Chamber</p>	<p>% % % %</p> <p>% % %</p> <p>% %</p>	
17	<p>▪ Valve Schedule/Type (Size in mm)</p> <p>(a) Main Steam Stop valve (b) Steam Safety (c) Blow Down (d) Level Controller Blow Down (e) Water Level Gauge Drain (f) Stop in Feed Line (g) Non-Return in Feed Line (h) Air Vent (i) Mobrey Isolation Stop (j) Pressure Gauge Stop (k) Any other.</p>		
18	<p>▪ Type of Controls</p> <p>(a) Water Level Indicator (b) Water Level Controls (c) Pressure Switches</p>		
19	<p>▪ Feed Water Pump</p> <p>(a) Make (b) Capacity (c) Motor Size (d) Head (e) Speed (f) Quantity</p> <p>▪ Construction Materials</p> <p>(a) Body (b) Impeller</p>	<p>(m³/hr) kW MLC Rpm</p>	
20	<p>▪ Primary Air Fan</p> <p>(a) Type</p>		

	(b) Capacity (c) Motor Size (d) Head	m ³ /hr kW mm.Wg	
21	<ul style="list-style-type: none"> ▪ Induced draught (I.D) Air Fan (a) Type (b) Capacity (c) Motor Size (d) Head 	m ³ /hr kW mm.Wg	
22	<ul style="list-style-type: none"> ▪ Type of Design (a) Package Unit (b) 3-Pass Wetback (c) Fire Tube (d) Nature of Pass (e) Non Reverse Flame 		
23	<ul style="list-style-type: none"> ▪ Construction Material (a) Plates (Standard) (b) Tubes (Standard) 		
24	<ul style="list-style-type: none"> ▪ Chimney a) (Stack height) b) Stack Diameter 		
25	<ul style="list-style-type: none"> ▪ Spark arrestors system provided- Yes/no 		
26	<ul style="list-style-type: none"> ▪ Ring main provided yes/ no 		
27	<ul style="list-style-type: none"> ▪ Crown valve- Straight or angle 		

23. DIESEL ENGINE DRIVEN ELECTRICITY GENERATOR 640 KVA

The 3PH brushless, self-exciting, self regulating Generator should be of 3-phase, 415 Volts, 50Hz and produce active (base load) power prime rated at **640 KVA at 0.8 P.F PRIME RATED** when operating at a minimum altitude of **2000** metres above sea level. The alternator shall be *STAMFORD* (UK make) or equivalent.

Generator shall be mounted on a common vibration controlled base frame and supplied complete with starter motor, **2 Nos. 12 volts Heavy duty** maintenance-free batteries, digital/analogue engine instrument and control panel incorporating ammeter, voltmeter, engine speed clock, phase selector switches, engine start/stop push-button, running hours counter, etc. Included in the panel will be instrument fuses and circuit breaker unit complete with cable termination. The generator shall have its own battery charger (**trickle charger**) for charging the batteries when generator is not in use.

The Engine shall have a shut down protection for low oil pressure, high water temperatures and over speed. The speed governor shall be electronic.

Internal PVC tropical grade wiring to class H and a 4-pole panel mounted main MCCB with reverse power protection to facilitate connection to main switchboard.

The supply shall include piping from existing fuel storage tank to diesel generator base fuel tank complete with vents. The Engine and alternator should be mounted on a steel fabricated base frame with integral fuel tank for daily service of minimum 600 litres. The tank shall be fitted with calibrated (litres) gauge measuring to the nearest 10litres of fuel balance. Additionally, one 1250 litre service fuel tanks made of 3mm (1/8”) mild steel sheet supplied complete with air vent, drain pipe, inlet pipe, hand pump to discharge from a standard 200L drum, engine feed piping and manhole on top cover. The exhaust pipe fitted with stainless steel vibration/expansion bellows shall be suitably fitted with a noise reducer (silencer) and shall exit 5 meters above the roof. The supply should include spare Oil, Air, Fuel filters, set of drive belts and maintenance tools. Included in the supply shall be operations and maintenance manuals, spare parts catalogue, fully dimensioned mounting and foundation drawings. The Supplier shall give adequate performance warranty, which shall not be less than twelve months. **The total cost should be inclusive of supply, deliver, installation, 1st and 2nd services, accommodation, transport and commissioning the Generator.**

NB You are required to give a test report for trial runs done after manufacture

DATA SHEET

Supply and install a prime rated at 640KVA Generator to TRFK Tea Factory
All bidders **shall** complete and submit the questionnaire below with their bids.

Item	Questionnaire : SPECIFY	RESPONSE
1.	Engine make and Origin	
2.	Engine type	
3.	Alternator make	
4.	KVA Rating	
5.	Power factor	
6.	Prime power	
7.	Panel- digital/Analogue	
8.	Base tank Diesel holding capacity	
9.	Operation and maintenance manual	
10.	List of spares.(Separate sheet)	
11.	Governor type	
12.	Warranty	
13.	Delivery period.	
14.	Reverse power protection MCCB	

24. FURNACE OIL STORAGE TANK (120,000 LTS) C/W GEARED PUMPS AND SERVICE TANKS:

FURNACE OIL STORAGE TANK (120,000 LTS)

A vertical mild steel fuel storage tank of 120,000 litres capacity mounted on a conical cylindrical slab to be provided by others.

The tank is cylindrical in shape and made from minimum 6mm (1/4") mild steel sheet and supplied complete with suitable fuel filters, manholes, air vent pipes, 64mm (2 1/2") bore Class 'C' black inlet pipes, 64mm (2 1/2") bore Class 'C' black service tank feed pipes all with appropriate flanges, bends, elbows, check valves, strainers, gate valves (not less than 9) and cleaning and blow down flanged pipes of 152mm (6") bore with bolted blind flange plate.

Also required for the will be a suitable oil depth gauge with weight heavy enough to enable it go through the viscous oil, a clearly marked external mechanical oil depth gauge and a strong mild steel external ladder with strong safety railing on the sides of the ladder and around top inspection manhole area. The tank will be supported on (1") thick asphalt/bitumen layers placed on cone-like concrete (base constructed as indicated on the drawing by others). The asphalt/bitumen layer is to be provided and laid on the concrete base by the tank supplier. Tank should be painted with black paint able to withstand effects of heat and oil.

Other items to be supplied giving specifications capacity and make as appropriate but quote for separately to include: -

A suitable steam and electric outflow heater (preferably 12kw, 415v, 3 phase with thermostatic control) should be provided in the storage tank to raise the oil temperature to 30°C.

The diameter of tank will be **4.5 metres** with a height of **7.6 metres**.
For more details see drawing provided.

Oil gear pumps.

The two gear pumps should be of the type **SRT/80** capable of giving flow rates of up to **10m³/hr** @300rpm or higher flow rates at higher speeds with a **Head of 50m**. The pumps should be suitable for factory furnace oil class 'E' and 'F'. Pumps should be coupled to electric motors on a common base frame complete with star delta starters and isolators, suitable for 3 phase, 50Hz AC mains supply. The motors shall be high efficiency motors. Note Catco Motors are not acceptable.

INSTALLATION

Allow for supply and installation of the following fittings.

- DN 65 dia black pipe class c- 60metres.
- DN 65 dia bends- 20 nos.
- DN 65 mm dia equal tee- 6nos.
- DN 65 mm dia sluice valve PN 16 as *Pegler* or equivalent - C/W matching flanges
- 65 mm fuel filters. - 2 Nos
- Allow for appropriate pipe support every 3m.

25. FURNACE FUEL SERVICE TANK (7500 L) - 2NOS.

Tanks having capacity of 7500 litres to be provided made from 5mm mild steel with suitable internal angle iron reinforcement and bracing but not less than 32mm x 32mm x 32mm. The tank will be 1.2m x 2.5m x 2.5m and supplied complete with air vents, 64mm (2 ½”) bore feed pipes to burners, 51mm bore drain pipes, 38mm bore burners branch feed pipes, check valves, gate valves, depth gauges, 32mm bore overflow pipes and suitable ladders specified and manufactured by bidder.

Seam welding during fabrication to be airtight, free from blowholes and capable of withstanding high internal pressures. Minimum **6kw** flame proof immersion type outflow fuel oil pre-heaters (complete with thermostats) for maintaining flow of furnace oil in coldest weather conditions to be provided respectively for the two tanks.

The tank should also be fitted with a clearly visible level indicator gauge. Temperature capillary thermometers of range 0 – 200⁰c and with dial of six inches (6”) should also be supplied together with the tank.

The tank stand will be made from 75mm x 75mm x 6mm angle iron suitably reinforced with the base dimension as 2.4m x 2.4m. The tank should be lagged with 1” fibreglass/mineral wool jacket and 1mm thick MS cladding sheet all round including the base and top. The M.S. cladding should be secured by riveting.

26. CONDENSATE HOLDING AND BOILER SERVICE TANK (7500 LTS):- 2NOS

Tank to be made out of mild steel plate of thickness 5mm

The dimensions of the tank are 2.5m long by 2.5m wide by 1.2m height.

The tank stand and base should be made out of 75mm x 75mm x 6mm angle iron and the height of the stand should be 3 meters so as to give an overall height of tank and stand of 5.4 meters overall. The dimensions of the tank angle base should be 2.4m x 2.4m.

The stand should be suitably reinforced by cross members as shown on the drawing. The tank should also be fitted with a clearly visible level indicator gauge. Temperature capillary thermometers of range 0 –200⁰c and a dial of six inches (6”) should also be supplied together with the tank. The make up water inlet/outlet should be fitted with a gate valve and a heavy duty float valve. The tank should be lagged with 1” fibreglass/mineral wool jacket and 1mm thick M.S. plate all round including the base and top. The M.S. jacket should be secured by riveting. Tank should be supplied complete with Standard cat ladder 5.4m long.

Accessories

Allow for supply and installation of the following accessories and fittings for the installation of the condensate tanks.

1. A graduated and visible level indicator
2. Temperature capillary thermometers range 0 –200⁰c and a dial of six inches (6”).-2 nos
3. 2 ½” gate valve as pegler or equal and approved –4 nos
4. 1” dia ball float valve complete with ball float- 2nos.
5. 6 Nos -Class C bends.
6. 6nos 2 ½” pipes -Class C Black pipe.
7. 2 ½” outlet gate valve PN 16-Temp 120 degrees. As pegler or equal and approved complete with matching flanges.-2 nos

27. WHEELED TROLLEY:

To be made of a suitable metal frame with the top having 114mm (7 ½”) radius cut out grooves to accommodate two 1000mm. X 210mm (36” x 13”) CTC rollers. The trolley to be supplied complete with a towing bar with cross handle, two rear and two front wheel with a common shaft rigidly fixed to a turntable. It is to be covered with polymer-base material and each to have a carrying capacity of at least 500kg. All the wheels to have pre-packed or grease lubricated ball bearings. The unit to measure approximately 762mm with 152mm (6”) diameter wheels and to be finish – painted over a primer with approved colour paint.

28. AUTOMATED CTC ROLLER SHARPENING LATHE C/W ATTACHMENT:

AUTOMATIC (Electro-mechanical NON-CNC) CTC ROLLER SHARPENING LATHE

- All operations including tool engagements and retraction forward and reverse movements and roller indexing are fully automatic and to precision to ensure precise linear shifting of the tool carriage for every chasing, requiring no manual intervention.
- A manual override option should be provided for manual operation of the machine in case of a system failure.
- In the event of power failure, the entire milling or chasing operations recommences from the where it was discontinued or equipped with a memory back up system to ensure that sharpening re-starts from the point it had stopped in the event of a power failure.
- The cross and lateral movements of the saddle and cross slides guides should be designed in a manner that it is less prone to wear and tear as compared to conventional cast iron bed.
- The bed shall be specially designed for high accuracy and long life. The heavy duty cast iron bed shall be fitted with high accuracy, hard chrome plated **linear guides/slides** to ensure chatter free operations. The linear **guides/ sliding rails** shall be replaceable for both the carriage and the cross slide travels.
- The lathe tail end shall have a 3 rollers or 4 rollers support sturdy for accurate and strong rear support for the roller during sharpening.
- The lead screws shall be the heavy duty ball screw type. The lead screw shall be made out of suitable steel such as EN-9 supported by heavy duty phosphor bronze leader nut in 2 halves complete with rolling balls and end flanges.
- The head stock shall be made out of suitable steel such as EN-9 worm shaft supported by heavy duty phosphor bronze worm wheel.
- The head stock shall be fitted with 16’’ dia chuck with 4 independent jaws
- All the pulleys, V belts and open shafts shall be fully enclosed in safety guards complete with interlock safety switches.
- The lathe shall be supplied complete with dial indicator with magnetic base, other accurate measuring instruments and operating manual.
- The lathe shall be fitted with CFL tube (whine lamp travelling with along the bed with the cutter to focus on the job.
- The lathe shall have an automatic cooling system to provide cooling of the cutting tool automatically during the job operation, complete with re-circulation Tank, Pump, Nozzles, piping, Filtration and other accessories.
- The sharpening lathe shall have an automatic lubricating system for periodic lubrication for the slides and the Ball screws.
- The lathe sharpening lathe shall be supplied with a ‘‘Hard Chromed Test Bar’’ with bright precision grinding finish of very low tolerance limits and perfectly centred at

both ends. The shaft shall be kept as a ‘‘master shaft’’ for periodical checking of the lathe alignment and bed wears etc. The shaft size shall be compatible with the dimensions of the lathe.

- The lathe shall have properly designed cast iron framework and shall be supplied complete with the foundation bolts.

NB

A set of machining and maintenance tools should be included for all the machines. A list of recommended spares as well as switches and starters if offered should be quoted for separately. Well-dimensioned foundation drawings including the necessary mounting bolts, nuts and washers should be part of the machinery supply. Quote for and supply of recommended spares for a 2 years operation period separately.

Automatic milling

- The lathe to be suitable for CTC Rollers ranging from 8’’ to 13’’ diameter to 24’’ to 52’’ in width.
- The milling head shall have auto indexing arrangement, multiple head stock speeds, quick carriage return, adjustable limit sensors.
- The motors for the cutter spindle and head stock drive shall be properly sized.
- The machine shall be supplied with four (4) Nos. 76mm (3’’) single angle 70° LH milling cutters.

Automatic chasing

- The machine should be capable for chasing circumferential grooves on CTC rollers of CTC Rollers ranging from 8’’ to 13’’ diameter to 24’’ to 52’’ in width and 8TPI/10TPI chasing as well as any kind of grooves.
- The machine shall be fitted with metal chips collection trays to ensure that no chips fall on the sliding beds and the lead screws.
- The machine shall be supplied with four (4) Nos. 51mm (2’’) wide chasing cutters/tools.

Roller sharpening machine data sheet per machine

	Description	Actual size
Overall Dimensions		
	Length	
	Width	
	Height	
Capacities		
	Centre height	
	ABC	
	Swing over Bed (dia)	
	Swing over Cross Slide (dia)	

	Width of bed	
	Length of bed	
	Spindle dia	
	Tool shank size	
Sharpening specifications		
For chasing	Chasing TPI	
	CTC roller length sizes	
	CTC roller Diameters	
For milling	Helical grooves	
	CTC roller length sizes	
	CTC roller Diameters	
Speed & feed – indicate for your lathe specs		
For chasing	Longitudinal Travel	
	Cross travel	
	Head stock – Range	
For milling	Forward -Range	
	Reverse	
	Cutter	
Power requirements – indicate for your lathe specs		
For chasing	Longitudinal Travel	
	Cross travel	
	Head stock	
	Coolant pump	
For milling	Traverse	
	Milling Cutter	
	Coolant pump	
Others		
Spare 4 jaw chuck supplied in the box.		
Power transmissions		
Motors efficiency specifications		
Travelling inspection lamp.	Yes/ No	
Replaceable slide rails	Yes/ No	
Guards with interlock	Yes/ No	

switches		
Hard Chromed Test Bar	Yes/ No	

29. CTC ROLLERS INSPECTION BENCH/JIG:

To be used primarily for roller Inspection and Meshing. The jig should be mounted on four castors and to be suitable for 912mm (36”) x 330mm (13”) CTC Rollers. Roller Meshing should be adjustable using two hand screws. Bearing journals to run on ball bearings with adjustable centre screws. Movable saddle supplied should allow either 912mm (36”) Rollers or Rollers of other sizes to be checked. To be supplied with fluorescent light under rollers to ensure clear and easy checking of meshing. Appropriate spare parts should be included in the supply giving a comprehensive list of such parts and quoting for these separately.

30. CTC MILLING CUTTER AND CHASER GRINDER

Should be robust and suitable for sharpening CTC milling cutters and chasers. To be supplied complete with suitable tool rest(s) and the necessary suitable for 415 volts, 50Hz; AC mains supply; protective limit stops; necessary safety guards; maintenance tools; maintenance and instruction manuals. Should have a cross travel movement of 0.025mm (0.001”) graduations. Foundation drawing including bolts, nuts and washers required for mounting purposes, to form part of the machinery supply.

31. MANUAL (HYDRAULIC) PALLET TRUCK 3000KG CAPACITY

The pallet truck should be hydraulically operated using a Tug Bar. The Tug Bar should automatically resume upright position when not in use. The Tug Bar to incorporate a hand operated release mechanism for controlling the lowering speed.

The truck to have a carrying capacity of 3000Kg, a maximum lifting height of 185mm and a platform length and width of 1500mm and 690mm respectively.

Truck to have two (2) single nylon rear wheels and two (2) pivot mounted nylon front wheels. All wheels should have self-lubricating ball bearings.

The platform fork opening should be 1130mm.

Submittal data

Attach detailed brochures of the pallet trucks quoted for.

32. HYDRAULIC WORKSHOP HOIST 3000KG (WORKSHOP CRANE):

The hoist is to be used for lifting/lowering moderately heavy workshop and factory components such as motors and CTC rollers. Should be hand operated hydraulic hoist robustly built and supply completed with preferably strong framed 2 swivel and 2 fixed steel wheel castors and a hydraulic boom capable of lifting, supporting, lowering and transporting factory and workshop components individually weighing up to 2.5 metric ton. The height of boom should be about 1676mm (5ft – 6”) and the minimum lift to be 2743mm (9ft). The boom should be rigidly supported to prevent bending or distorting on load. Operation and maintenance manuals should be provided. The bidder to recommend a suitable hydraulic fluid for the hoist and a list of spares quoted for separately.

33. MULTIPURPOSE LATHE MACHINE:

To be general-purpose high precision lathe machines. The lathe structural body to be made out of hardened cast iron with the bed made out of hardened ground cast iron.

The dimensions of the machines to be as follows: -

- | | | |
|--------------------------------------|---|-------|
| 1.) Overall length of Lathe | - | 3m |
| 2.) The bed Width | - | 0.8m |
| 3.) Height of Lathe centre | - | 350mm |
| 4.) Swing Capacity over the bed | - | 580mm |
| 5.) Swing Capacity within cross line | - | 380mm |
| 6.) Swing Capacity within the gap | - | 760mm |
| 7.) Admit between center | - | 2.5mm |
| 8.) Spindle bore diameter | - | 75mm |

A coolant re-circulation systems c/w pump should be included.

The Lathe machine should be driven by a 3-phase, 50HZ Electric Motor and capable of heavy turning, boring, milling, grinding gear cutting, threading and other miscellaneous lathe operations.

The Lathe should be supplied complete with safety guards, emergency stop button, lockable isolator switch, reversible switch and thread dial switch. All pulleys, V belts and open rotating shafts should be fully enclosed in the guard.

The Lathe should be supplied with all the attachments necessary to perform all the multiple duties described herein. Among the attachments, are four and three jaw collet chucks, fixed and follow steady rests, taper turning attachment, milling and keyway attachment, Grinding attachment as well as four and six position indexing turrets for tailstock.

34. WORKSHOP BENCH:

To be made of RHS of dimensions 75mm x 75mm x 6mm (3" x 3" x 1/4") leg supports, sides and end members. Minimum overall size should be 2134mm x 914mm x 914mm (7ft x 3ft x 3ft). The sheet metal covering for the bench top should be 6mm (1/4") black sheet and suitably reinforced with 1 1/2" x 1 1/2" x 1/4" angle iron underneath. The bench to be constructed and to be finish-painted as directed with approved colour paint according to the Drawing supplied.

35. WELDING BENCH:

To be made of RHS of dimensions 75mm x 75mm x 6mm (3" x 3" x 1/4") leg supports, sides and end members. Minimum overall size should be 2134mm x 914mm x 914mm (7ft x 3ft x 3ft). The sheet metal covering for the bench top should be 6mm (1/4") black sheet and suitably reinforced with 1 1/2" x 1 1/2" x 1/4" angle iron underneath. The bench to be constructed and to be finish-painted as directed with approved colour paint according to the Drawing supplied.

There will be a centrally placed 457mm (18") wide 18 gauge sheet metal drawer and the supporting legs will be 102mm x 102mm (4" x 4") well-seasoned planed hardwood timber bolted to the frame. An open tray beneath the bench to end drawer made from well-seasoned planed hardwood. The unit to be finish-painted as directed with an approved colour paint (s).

36. UNDERGROUND DIESEL RESERVOIR TANK (15,000 LITRES) SPECIFICATIONS

Supply and install 15,000 litres underground diesel reservoir tank

EXCLUSION: All civil works.

CONSTRUCTION

The tanks shall be cylindrical in shape. The tank shall be manufactured from 6mm thick mild steel plates. The tank will be horizontally installed.

FITTINGS AND ACCESSORIES

The following fittings and accessories are to be provided.

- a) Inlet pipe to be 64mm (2 1/2") class C black pipe and shall have an end cap.
- b) The vent pipe shall be 38mm class C black pipe. Allow for necessary bends.
- c) The outlet shall be 50mm class C black pipe and will have a check valve and a strainer. Allow for bends, unions etc to connect to the fuel dispenser.
- d) The dipping pipe shall be 38mm and shall have an end cap.
- e) The manhole shall be 608mm in diameter and shall house the dipping pipe, suction pipe, inlet pipe and vent pipe.
- f) The inlet pipe, suction pipe, and dipping pipe will be at a depth of 100mm from the bottom of the tank.

d) Appropriately spaced lifting lags shall be provided.

CALIBRATION

The tank will be calibrated by Kenya Bureau of standards or by any supplier authorized by KEBS. A certificate of calibration shall be issued and a graduated dipstick issued. The calibration will be witnessed and verified at the supplier's workshop by TRFK Engineers.

FINISH

The outer surface of the tank shall be bitumen painted to prevent rusting.

All bids will include a detailed drawing clearly showing the tank size, all fittings and accessories.

37. DIESEL DISPENSER PUMP

The dispenser shall meet the following specifications.

Capacity – **50 lpm**

Suction head (minimum) – **4 meters**

The dispenser shall have a suitable **calibrated digital flow meter with a mechanical register** able to read **eight digits** to the nearest **0.01 litres**.

The Dispensing pump shall be driven by a suitably sized single phase 220/240 volts A.C Motor. An alternative manual drive shall be provided.

The discharge nozzle shall be fitted with fuel sensor to trip the pump drive.

The dispenser shall be equipped with suitable shatter proof lighting fittings. The installation contractor shall provide all the installation materials including class B GI **pipe work and fittings**.

The bidder shall attach a brochure/literature and fill in the technical data for the dispenser below;

TECHNICAL DATA SHEET

Item	Questionnaire : Specify	
1.	Dispenser make and origin	
2.	Mains supply	
3.	Motor rating	
4.	Pump capacity	
5.	Pump suction head	
6.	Flow meter accuracy	
7.	Register type- Digital / analogue	
8.	Register accuracy	
9.	Warranty period	

38. PRE- BOILER WATER TREATMENT

SCOPE

Supply, install, commission Pre boiler water treatment for TRFK Managed factories. Train Factory Technician (Operator) on operation and maintenance of the Pre treatment plant.

REQUIREMENT

The water produced must meet boiler water quality. The Raw water will be analyzed by the successful bidder to ensure plant supplied is able to work effectively.

The following are the parameters expected after treatment

Turbidity-Maximum 5-NTU.

Colour- max 15TCU

Total hardness- Max 5

Ph - 7

SPECIFICATIONS

The plant will be rated at 6m³/hr.

The plant will contain the conventional process of coagulation, flocculation, sedimentation and filtration and conditioning to meet the boiler water requirements.

OPERATION

The plant will draw water from an overhead tank 10m high (existing). Using a 5m³/hr pump at a suitable head. The water will pass through a mechanical filter to remove large particles that may be present in the feed water. The primary coagulant and the polymer coagulant aid will then be added using suitably sized chemical dosing pumps as

prominent beta or equivalent before the water enters the flocculation and coagulation chamber.

The flocculation and coagulation chamber should be designed to attain flocculation and coagulation within 20 minutes.

The clarifier water will then enter the primary media filter, which will have an array of granular media filters with a layer of crushed basalt.

The water from the primary media filter will then flow to the multi media filter with high filter media bed.

The water from the multi media filter will then dosed with a ph adjustment chemical using a suitable chemical solution using a suitably sized prominent beta dosing pump or equivalent.

The dosing rates should be fully automated.

The water will then flow through suitably sized and designed water softener and then into 2000 litre storage tank. The water will then be pumped to the boiler feed water tank.

A backwashing line will be provided from the Sampling points will be provided at strategic positions

The full scope of supply will be;

2Nos water pumps rated at 5m³/hr at a suitable head (dependent on head loss across the whole system) complete with control panel no flow switch for the incoming water and high pressure switch control (alternate –high level float switch)

Mechanical screen filter.

Flocculants and coagulant dosing pumps complete with the chemical holding tanks, Flocculation and Coagulation tank suitably sized.

Primary filter media tank with filter media

Multimedia filter tank with filter media

PH adjustment dosing pump complete with the chemical holding tank and control panel and residual chlorine sensors suitably positioned.

2000 Litre plastic holding tank, complete with 1 1/4” ball float valve.

Backwashing pump suitably sized.

UPVC Pipe work PN 10- for the whole system together with the necessary isolating valves, Non return valves, unions etc

3 nos sampling points.

The whole package will come assembled on a common base frame

System control

The control system should allow for continuous operation, with the exception of backwash cycles. There will be audible alarm for backwash, that will be time or pressure activate. A Programmable Controller PLC will be installed in the central electrical control board and will transmit an alarm in the event of medial vessel

clogging (for manual backwash initiation) with all necessary I/o as dictated by the system design.

Technical Offer

The technical offer will come complete with the following information.

- Schematic layout of the system being offered**
- Detailed brochure**

Water Samples

The successful bidder is expected to carry out independent water sampling and adjustment after the installation is complete to ensure the plant meets boiler make up water requirements.

39. PORTABLE WATER TREATMENT PLANT

- Supply, install, commission packaged water treatment at TRFK.
- Train Factory Technician (Operator) on operation and maintenance of the packaged water treatment plant.

REQUIREMENT

The water produced must meet WHO drinking water standards particularly in the following criteria.

- **Turbidity-Maximum 5-NTU.**
- **Colour- max 15TCU**
- **Total coliform count per 100ml-0**
- **Total faecal coliform per 100ml-0**
- **Ph 6.5-8.5**

SPECIFICATIONS

The plant will be rated at 5m³/hr.

The plant will contain the conventional process of coagulation, flocculation, sedimentation and filtration.

OPERATION

The plant will draw water from an overhead tank 10m high (existing). Using a 5m³/hr pump at a suitable head. The water will pass through a mechanical filter to remove large particles that may be present in the feed water. The primary coagulant and the polymer coagulant aid will then be added using suitably sized chemical dosing pumps as

prominent beta or equivalent before the water enters the flocculation and coagulation chamber.

The flocculation and coagulation chamber should be designed to attain flocculation and coagulation within 20 minutes.

The clarifier water will then enter the primary media filter, which will have an array of granular media filters with a layer of crushed basalt.

The water from the primary media filter will then flow to the multimedia filter with high filter media bed.

The water from the multimedia filter will then be disinfected using hypochlorite solution using a suitably sized prominent beta dosing pump or equivalent.

The disinfecting dosing rate should be fully automatic depending on the residual chlorine in clean water tank.

The disinfected water will then flow to a 2000litre Plastic tank (clean water tank) as *Roto* or equivalent).

A backwashing line will be provided from the 2000 litre storage tank.

Sampling points will be provided at strategic positions

The full scope of supply will be

1. 2Nos water pumps rated at 5m³/hr at a suitable head (dependent on head loss across the whole system) complete with control panel no flow switch for the incoming water and high pressure switch control (alternate –high level float switch)
2. Mechanical screen filter.
3. Flocculants and coagulant dosing pumps complete with the chemical holding tanks,
4. Flocculation and Coagulation tank suitably sized.
5. Primary filter media tank with filter media
6. Multimedia filter tank with filter media
7. Hypochlorite dosing pump complete with the chemical holding tank and control panel and residual chlorine sensors suitably positioned.
8. 2000 Litre plastic holding tank, complete with 1 1/4” ball float valve.
9. Backwashing pump suitably sized.
10. UPVC Pipe work PN 10- for the whole system together with the necessary isolating valves, Non return valves, unions etc
11. Three (3) sampling points.
12. The whole package will come assembled on a common base frame

System control

The control system should allow for continuous operation, with the exception of backwash cycles. There will be audible alarm for backwash, that will be time or pressure activate. A Programmable Controller PLC will be installed in the central electrical control board and will transmit an alarm in the event of medial vessel

clogging (for manual backwash initiation) with all necessary I/O as dictated by the system design.

Technical Offer

The technical offer will come complete with the following information.

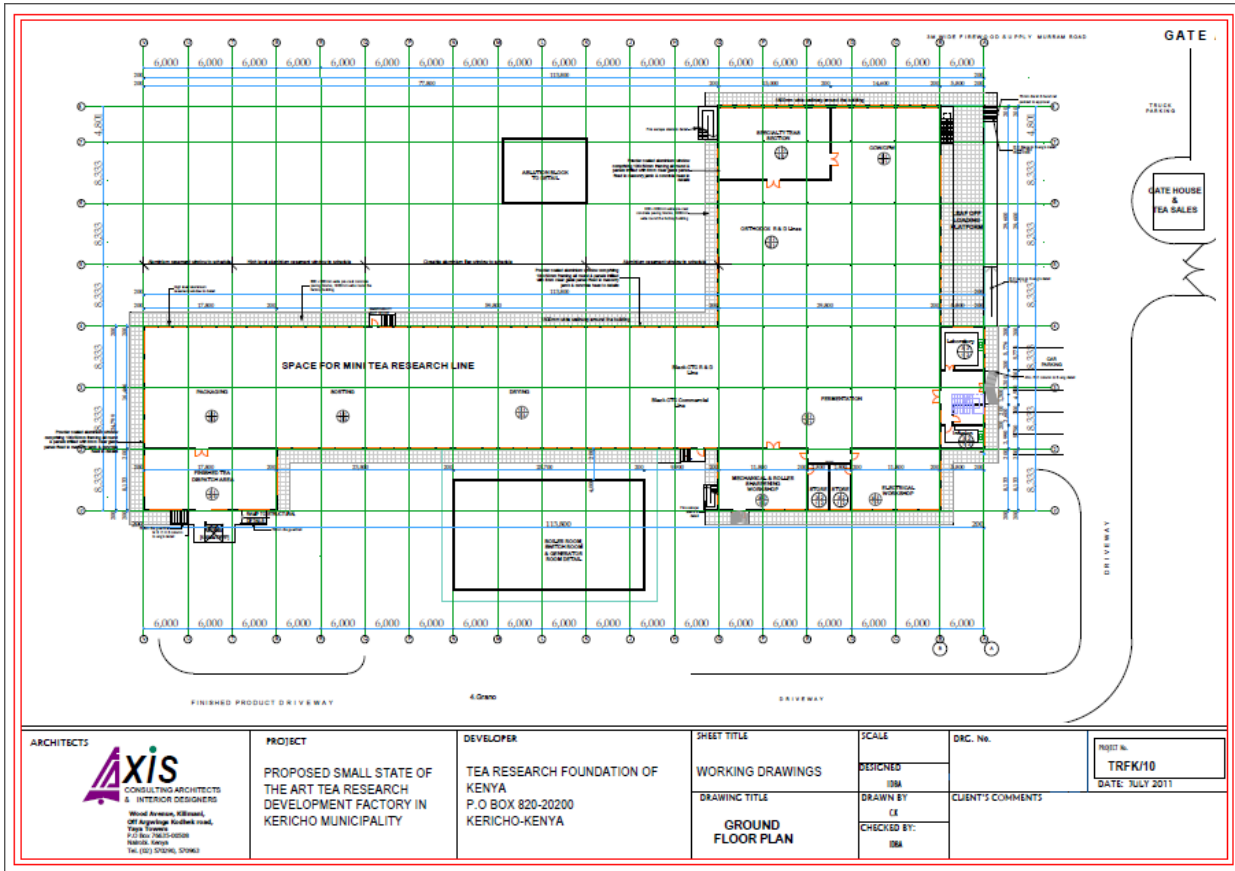
- **Schematic layout of the system being offered**
- **Detailed brochure**

Water Samples

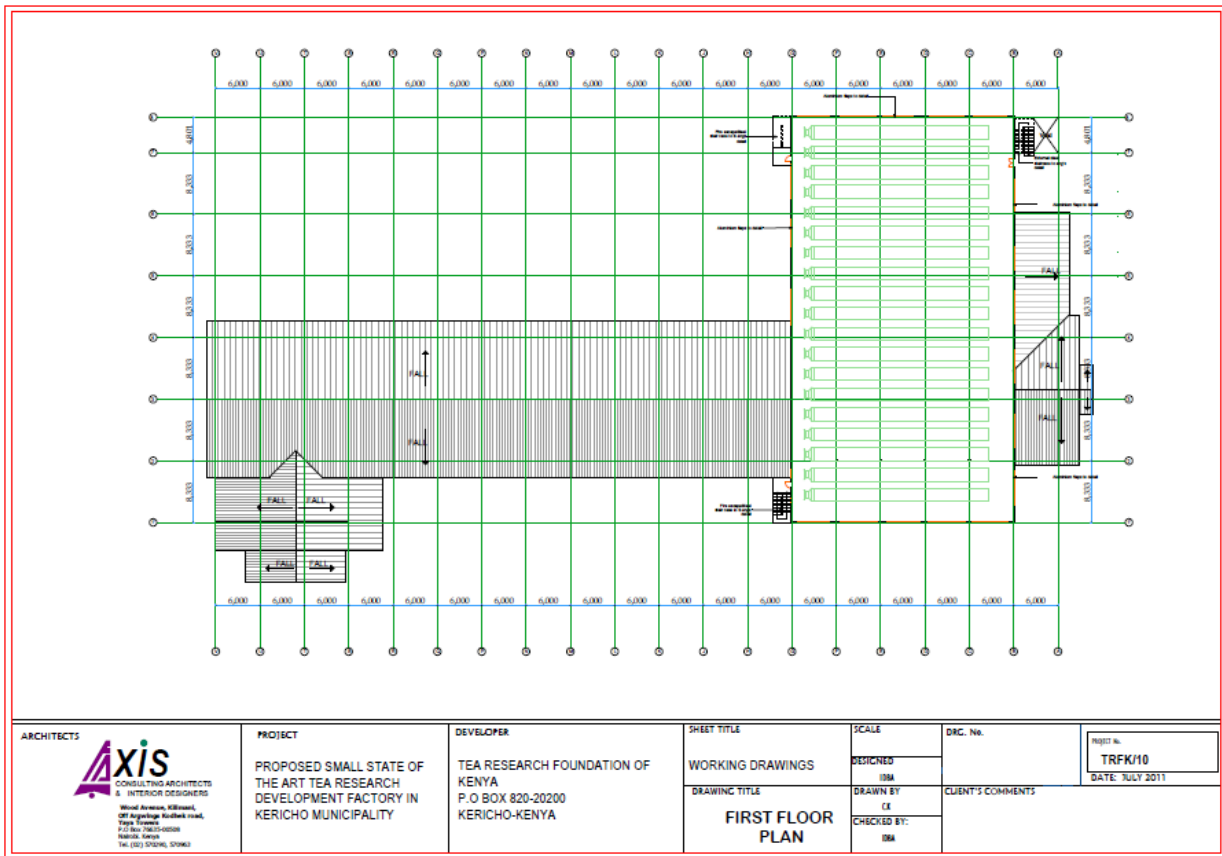
The successful bidder is expected to carry out water sample analysis before installation to identify whether any other auxiliary equipment shall be required other than what is specified in order for the water to meet WHO Standards.

FACTORY PALN AND ELEVEATION

Ground Floor



First floor



ARCHITECTS
Axis
 CONSULTING ARCHITECTS
 & INTERIOR DESIGNERS
 World Avenue, Kilimani,
 Off Ngaraile Road,
 Parklands,
 P.O. Box 79833-0020
 Nairobi, Kenya
 Tel: (020) 27061, 27062

PROJECT
 PROPOSED SMALL STATE OF
 THE ART TEA RESEARCH
 DEVELOPMENT FACTORY IN
 KERICHO MUNICIPALITY

DEVELOPER
 TEA RESEARCH FOUNDATION OF
 KENYA
 P.O BOX 820-20200
 KERICHO-KENYA

SHEET TITLE
 WORKING DRAWINGS
 DRAWING TITLE
**FIRST FLOOR
 PLAN**

SCALE
 DESIGNED
 ISM
 DRAWN BY
 CE
 CHECKED BY:
 ISM

DISC. No.
 CLIENT'S COMMENTS

PROJECT No.
TRFK/10
 DATE: JULY 2011

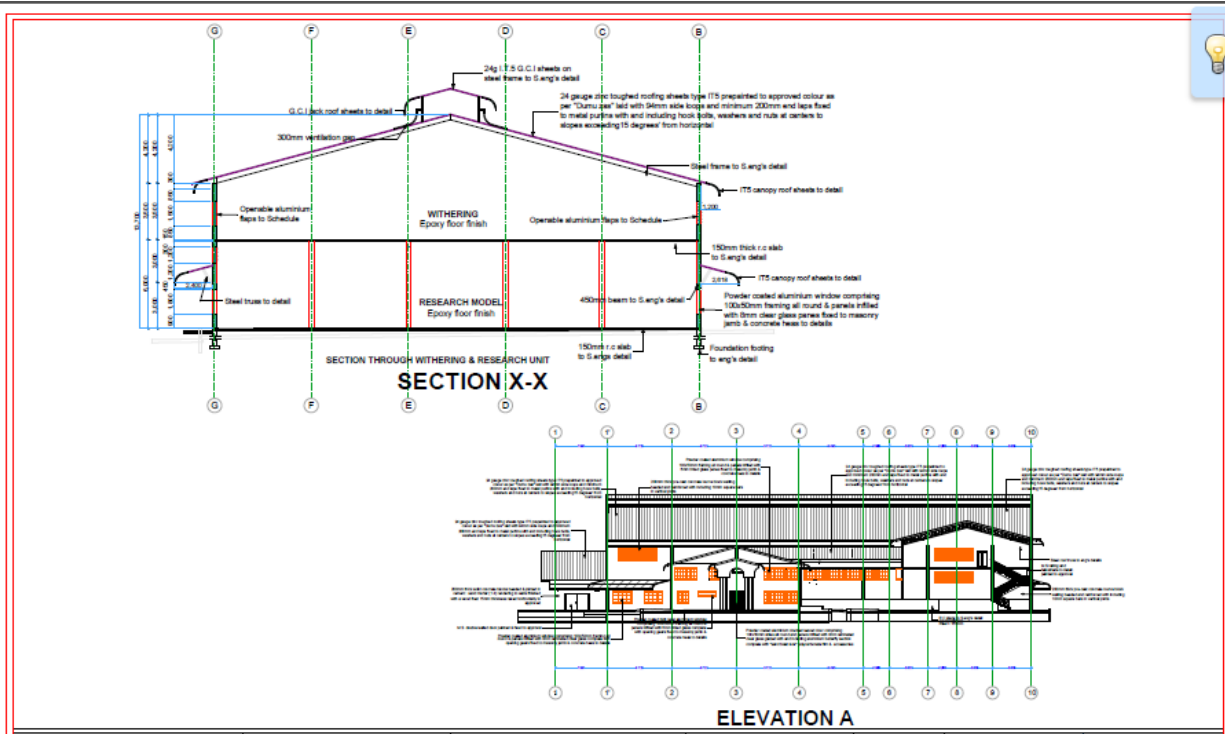
Elevation

ELEVATION B

ELEVATION D

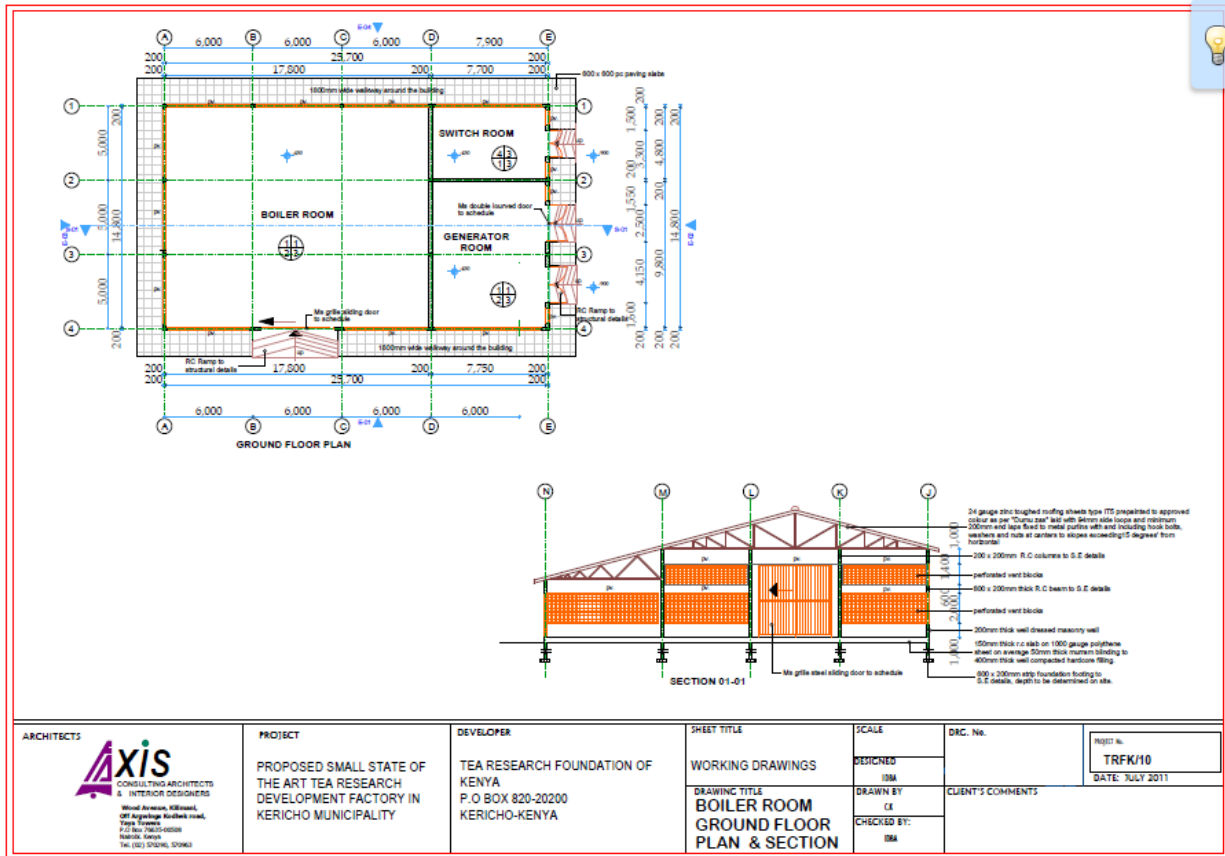
ARCHITECTS Axis CONSULTING ARCHITECTS & INTERIOR DESIGNERS Wood Avenue, Kilimani, Off Langata Road, Nairobi, Kenya P.O. Box 28200 Nairobi, Kenya Tel: 011 252461, 252462	PROJECT PROPOSED SMALL STATE OF THE ART TEA RESEARCH DEVELOPMENT FACTORY IN KERicho MUNICIPALITY	DEVELOPER TEA RESEARCH FOUNDATION OF KENYA P.O BOX 820-20200 KERicho-KENYA	SHEET TITLE	SCALE	DRG. No.	Project No. TRFK/10 DATE: JULY 2011
			WORKING DRAWINGS DRAWING TITLE ELEVATIONS	DESIGNED ISBA DRAWN BY CX CHECKED BY: ISBA		

Section elevation



ARCHITECTS Wood Avenue, Kilimani, Off Ngara Road, Upper Shauri Moyo, P.O. Box 21428, Nairobi, Kenya Tel: (011) 252061, 252062	PROJECT PROPOSED SMALL STATE OF THE ART TEA RESEARCH DEVELOPMENT FACTORY IN KERICHO MUNICIPALITY	DEVELOPER TEA RESEARCH FOUNDATION OF KENYA P.O BOX 820-20200 KERICHO-KENYA	SHEET TITLE	SCALE	DRG. No.	PROJECT No. TRFK/10 DATE: JULY 2011
			WORKING DRAWINGS DESIGNED: ISM	DRAWN BY: CX CHECKED BY: ISM		
			ELEVATIONS & SECTIONS			

Boiler plan



ARCHITECTS
Axis
 CONSULTING ARCHITECTS
 &
 INTERIOR DESIGNERS
 World Avenue, Kilimani,
 Off Ngaraile Road,
 Ngaraile, Nairobi,
 P.O. Box 74815-00202
 Nairobi, Kenya
 Tel: (011) 275961, 275962

PROJECT
 PROPOSED SMALL STATE OF
 THE ART TEA RESEARCH
 DEVELOPMENT FACTORY IN
 KERICHO MUNICIPALITY

DEVELOPER
 TEA RESEARCH FOUNDATION OF
 KENYA
 P.O BOX 820-20200
 KERICHO-KENYA

SHEET TITLE
 WORKING DRAWINGS
 DRAWING TITLE
**BOILER ROOM
 GROUND FLOOR
 PLAN & SECTION**

SCALE
 DESIGNED:
 BSA
 DRAWN BY:
 CE
 CHECKED BY:
 BSA

DEC. No.
 PROJECT No.
TRFK/10
 DATE: JULY 2011

CLIENT'S COMMENTS

SECTION VII - STANDARD FORMS

Notes on the Standard Forms:

7.1 Form of Tender

This form must be completed by the tenderer and submitted with the tender documents. It must also be duly signed by duly authorized representative of the tenderer.

7.2 Confidential Business Questionnaire Form

This form must be completed by the tenderer and submitted with tender documents

7.3 Tender Security Form

When required by the tender document the tenderer shall provide the tender security either in the form included therein after or in another format acceptable to the procuring entity.

7.4 Contract Form

The Contract form shall not be completed by the tenderer at the time of submitting the tenderer at the time of submitting the tender. The contract form shall be completed after contract award.

7.5 Performance Security form

The performance security form should not be completed by the tenderer at the time of tender preparation. Only the successful tenderer will be required to provide performance security in the sum provided herein or in another form acceptable to the procuring entity.

7.6 Bank Guarantee for Advance Payment.

When there is an agreement to have Advance payment, this form must be duly completed.

7.7 Manufacturer's Authorization Form

When required by the tender document, this form must be completed and submitted with the tender document. This form will be completed by the manufacturer of the goods where the tender is an agent.

8.0 Bidder's Declaration and Integrity Pact

7.1 **FORM OF TENDER**

Date _____
Tender No. _____

To: _____
[name and address of procuring entity]

Gentlemen and/or Ladies:

1. Having examined the tender documents including Addenda Nos. [insert numbers].the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply deliver, install and commission (..... (insert equipment description) in conformity with the said tender documents for the sum of (total tender amount in words and figures) or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Tender.

2. We undertake, if our Tender is accepted, to deliver install and commission the equipment in accordance with the delivery schedule specified in the Schedule of Requirements.

3. If our Tender is accepted, we will obtain the guarantee of a bank in a sum of equivalent to _____ percent of the Contract Price for the due performance of the Contract , in the form prescribed by(Procuring entity).

4. We agree to abide by this Tender for a period of [number] days from the date fixed for tender opening of the Instructions to tenderers, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. This Tender, together with your written acceptance thereof and your notification of award, shall constitute a Contract, between us. Subject to signing of the Contract by the parties.

6. We understand that you are not bound to accept the lowest or any tender that you may receive.

Dated this _____ day of _____ 20 _____

[signature]

[in the capacity of]

Duly authorized to sign tender for an on behalf of _____

7.2 CONFIDENTIAL BUSINESS QUESTIONNAIRE FORM

You are requested to give the particulars indicated in Part 1 and either Part 2(a), 2(b) or 2 (c) whichever applied 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
 Plot No..... Street/Road
 Postal Address Tel No. Fax E mail
 Nature of Business ,.....
 Registration Certificate No.
 Maximum value of business which you can handle at any one 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

Given details of partners as follows:

Name	Nationality	Citizenship Details	Shares
12.			
13.			
14.			
15.			

Part 2 (c) – Registered Company

Private or Public
 State the nominal and issued capital of company-
 Nominal Kshs.
 Issued Kshs.
 Given details of all directors as follows

Name	Nationality	Citizenship Details	Shares
1.....			
2.....			
3.....			
4.....			
5.....			

Date Seal/Signature of Candidate

7.3 TENDER SECURITY FORM

Whereas [*name of the tenderer*]
(hereinafter called “the tenderer”) has submitted its tender dated [*date of submission of tender*] for the supply, installation and commissioning of [*name and/or description of the equipment*]
(hereinafter called “the Tender”) KNOW ALL PEOPLE by these presents that WE of having our registered office at (hereinafter called “the Bank”), are bound unto [*name of Procuring entity*] (hereinafter called “the Procuring entity”) in the sum of for which payment well and truly to be made to the said Procuring entity, 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 the tenderer withdraws its Tender during the period of tender validity specified by the tenderer on the Tender Form; or
2. If the tenderer, having been notified of the acceptance of its Tender by the Procuring entity during the period of tender validity:
 - (a) fails or refuses to execute the Contract Form, 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 Procuring entity up to the above amount upon receipt of its first written demand, without the Procuring entity having to substantiate its demand, provided that in its demand the Procuring entity will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This tender 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 above date.

[signature of the bank]
(Amend accordingly if provided by Insurance Company)

7.4 CONTRACT FORM

THIS AGREEMENT made the _____ day of _____ 20 _____ between
..... [*name of Procurement entity*] of [*country of Procurement entity*] (hereinafter
called “the Procuring entity) of the one part and [*name of tenderer*] of
..... [*city and country of tenderer*] (hereinafter called “the tenderer”) of the other part;

WHEREAS the Procuring entity invited tenders for [certain goods] and has accepted a tender by the
tenderer for the supply of those goods in the sum of [*contract price in
words and figures*] (hereinafter called “the Contract Price).

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to:
2. The following documents shall be deemed to form and be read and construed as part of this Agreement viz:
 - (a) the Tender Form and the Price Schedule submitted by the tenderer
 - (b) the Schedule of Requirements
 - (c) the Technical Specifications
 - (d) the General Conditions of Contract
 - (e) the Special Conditions of contract; and
 - (f) the Procuring entity’s Notification of Award
3. In consideration of the payments to be made by the Procuring entity to the tenderer as hereinafter mentioned, the tenderer hereby covenants with the Procuring entity to provide the goods and to remedy the defects therein in conformity in all respects with the provisions of this Contract
4. The Procuring entity hereby covenants to pay the tenderer in consideration of the provisions of the goods and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, sealed, delivered by _____ the _____ (for the Procuring entity)

Signed, sealed, delivered by _____ the _____ (for the tenderer in the presence of _____

7.5 PERFORMANCE SECURITY FORM

To
[*name of Procuring entity*]

WHEREAS [*name of tenderer*] (hereinafter called “the tenderer”) has undertaken , in pursuance of Contract No. _____ [*reference number of the contract*] dated _____ 20 _____ to _____ supply [*description of goods*] (hereinafter called “the Contract”).

AND WHEREAS it has been stipulated by you in the said Contract that the tenderer shall furnish you with a bank guarantee by a reputable bank for the sum specified therein as security for compliance with the Tenderer’s performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the tenderer a guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the tenderer, up to a total of [*amount of the guarantee in words and figure*] and we undertake to pay you, upon your first written demand declaring the tenderer to be in default under the Contract and without cavil or argument, any sum or sums within the limits of [*amount of guarantee*] as aforesaid, without you needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the _____ day of _____ 20 _____

Signed and seal of the Guarantors

[*name of bank or financial institution*]

[*address*]

[*date*]

(Amend accordingly if provided by Insurance Company)

7.6 BANK GUARANTEE FOR ADVANCE PAYMENT

To
[name of Procuring entity]

[name of tender]

Gentlemen and/or Ladies:

In accordance with the payment provision included in the Special Conditions of Contract, which amends the General Conditions of Contract to provide for advance payment, [name and address of tenderer](hereinafter called “the tenderer”) shall deposit with the Procuring entity a bank guarantee to guarantee its proper and faithful performance under the said Clause of the Contract an amount of [amount of guarantee in figures and words].

We, the [bank or financial institutions], as instructed by the tenderer, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to the Procuring entity on its first demand without whatsoever right of objection on our part and without its first claim to the tenderer, in the amount not exceeding [amount of guarantee in figures and words]

We further agree that no change or addition to or other modification of the terms of the Contract to be performed there-under or of any of the Contract documents which may be made between the Procuring entity and the tenderer, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition, or modification.

This guarantee shall remain valid in full effect from the date of the advance payment received by the tenderer under the Contract until [date].

Yours truly,

Signature and seal of the Guarantors

[name of bank or financial institution]

[address]

[date]

7.7 MANUFACTURER’S AUTHORIZATION FORM

To *[name of the Procuring entity]*

WHEREAS*[name of the manufacturer]* who are established and reputable manufacturers of
[name and/or description of the goods] having factories at
..... *[address of factory]* do hereby authorize
..... *[name and address of Agent]* to submit a tender, and subsequently negotiate and sign the Contract with you against tender No.
..... *[reference of the Tender]* for the above goods manufactured by us.

We hereby extend our full guarantee and warranty as per the General Conditions of Contract for the goods offered for supply by the above firm against this Invitation for Tenders.

[signature for and on behalf of manufacturer]

Note: This letter of authority should be on the letterhead of the Manufacturer and should be signed by an authorized person.

7.8. LETTER OF NOTIFICATION OF AWARD

Address of Procuring Entity

To: _____

RE: Tender No. _____

Tender Name _____

This is to notify that the contract/s stated below under the above mentioned tender have been awarded to you.

1. Please acknowledge receipt of this letter of notification signifying your acceptance.
2. The contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.
3. You may contact the officer(s) whose particulars appear below on the subject matter of this letter of notification of award.

(FULL PARTICULARS) _____

SIGNED FOR ACCOUNTING OFFICER

FORM RB 1
REPUBLIC OF KENYA
PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO.....OF.....20.....

BETWEEN

.....APPLICANT

AND

.....RESPONDENT (*Procuring Entity*)

Request for review of the decision of the..... (*Name of the Procuring Entity*) ofdated the...day of20.....in the matter of Tender No.....of20...

REQUEST FOR REVIEW

I/We.....the above named Applicant(s), of address: Physical address.....Fax No.....Tel. No.....Email, hereby request the Public Procurement Administrative Review Board to review the whole/part of the above mentioned decision on the following grounds , namely:-

- 1.
- 2.
- etc.

By this memorandum, the Applicant requests the Board for an order/orders that: -

- 1.
- 2.
- etc

SIGNED(Applicant)

Dated on.....day of/...20...

FOR OFFICIAL USE ONLY

Lodged with the Secretary Public Procurement Administrative Review Board on day of20.....

SIGNED
Board Secretary

8. BIDDER'S DECLARATION AND INTEGRITY PACT

8.1 Bidder's Declaration

We/I the undersigned, in the capacity of
..... for [name of the
company/firm/individual] certify that the **bidder is not in any of the following situations:**

- 1 Bankruptcy; are the subject of proceedings for a declaration of bankruptcy, or of an order for compulsory winding up or administration by court, or of any other similar proceedings;
- 2 Payments to us have been suspended in accordance with the judgment of a court other than a judgment declaring bankruptcy and resulting, in accordance with our national laws, in the total or partial loss of the right to administer and dispose off our property;
- 3 Legal proceedings have been instituted against us involving an order suspending payments and which may result, in accordance with our national laws, in a declaration of bankruptcy or in any other situation entailing the total or partial loss of the right to administer and dispose of our property;
- 4 Are being wound up, or our affairs are being administered by court, or have entered into an arrangement with creditors, or have suspended business activities or are subject to an injunction against running business by a court of law;
- 5 Have been convicted by a final judgment of any crime or offence concerning our/my professional conduct;
- 6 Are guilty of serious misrepresentation with regard to information required for participation in an invitation to tender or execution of a tender already awarded; and
- 7 Are in breach of contract on another contract with the Government of Kenya or other local or international contracting authority or foreign government.
- 8 Have been convicted of an offence concerning our/my professional conduct by a court of law, or found guilty of grave professional misconduct;
- 9 Have not fulfilled obligations relating to payments of taxes or statutory contributions.

If the bidder is in any of the above listed situations, kindly attach documents giving details of the situation.

Names in full: [.....]

Duly authorized to sign this bid on behalf of (bidder's name):

[.....]

Place and date: [.....]

Stamp of the firm/company:

8.2 Integrity Pact

Bidder's Oath to fulfill the Integrity Pact

Accepting that transparent business management and fair public administration are key to social development and national competitiveness, and in an effort to purge corruption and apply sanctions to corrupt businesses, and in full support of the worthy goals of this Integrity Pact, concerning the present tender for _____, all personnel of _____ and its sub-contractors and agents hereby agree that:

- 8.2.1 We shall not conduct any unethical business practices, such as bid-rigging for the sake of a particular bidder to win the bid, or price-fixing. If proven as a fact that we have engaged in bid-rigging for the sake of a particular bidder to win the bid, we shall accept to be prohibited from submitting bids placed by Kenya Agriculture & Livestock Research Organization (herein referred to as KALRO) for a period of two (2) years. If proven that we have discussed with other bidders in a bid to fix a price, or rigged a bid for a particular bidder to win the bid, we shall accept the prohibition from submitting bids placed by KALRO for a period of two (2) years. If any unethical behavior is tantamount to a fraudulent practice, we accept that such a case may be handed over to the authorities for investigation and possible prosecution.
- 8.2.2 In the process of bidding, or concluding or execution of a contract, we shall not offer any bribe, gifts, entertainment or any other undue benefits directly or indirectly to related officials, and in case it is proved that we have violated any terms of this Integrity Pact in relation with a bid, or concluding or execution of a contract, or offered bribes for favors in a contract, to win a contract, or facilitate payment which should not have been forthcoming, we shall accept the prohibition from submitting a bid placed by KALRO for a period of two (2) years. If proven as a fact that we have offered bribes to KALRO or related officials for favors regarding a bid or contract to a bidder or a winning bidder, or for the purpose of faulty execution of the objectives of a contract, we shall accept the prohibition from submitting bids placed by KALRO for a period of two (2) years. If proven that we have offered bribes to KALRO or related officials in relation to bidding, or concluding or execution of a contract, we shall accept the prohibition from submitting bids placed by KALRO for a period of two (2) years.
- 8.2.3 In case it is proven that we have offered bribes to a related official or a KALRO official regarding a bid, or concluding or execution of a contract, we shall accept the cancellation of the contract, and shall not file any civil, administrative or criminal appeals.
- 8.2.4 We shall make our best effort to institute a Company Code of Conduct that prohibits bribery, bid rigging/fixing or any other corrupt practices in business relations with officials and KALRO, and a company regulation that prohibits any retaliatory acts toward anyone reporting inside corruption.
- 8.2.5 In addition, I confirm on behalf of the bidder that the details included in the bidders profile and experience sheet and our quotation are correct to the best of my knowledge and belief. In addition, we authorize, KALRO to seek information from any source to confirm our compliance with the requirements of this Integrity Pact.

8.2.6 The bidder authorizes KALRO, to seek information from any source, including publication of the name of the bidder to confirm that the bidder is compliant with the requirements of this Integrity Pact.

We shall fulfill this Integrity Pact as a solemn oath made on the basis of mutual trust, and, if and when we win a bid, we shall sign and fulfill the above as a “Special Condition of Contract,” and not file any civil, administrative or criminal appeals regarding any of the above terms.

Dated: _____

Signed by: _____
(Chief Executive/Chief Executive Officer)

Full Name printed: _____

8.3 TENDER SECURING DECLARATION FORM

[The Bidder shall fill in this Form in accordance with the instructions indicated.]

Date:

Tender No.....

To: Kenya Agriculture & Livestock Research Organization (KALRO)

We, the undersigned, declare that:

1. We understand that, according to your conditions, bids must be supported by a Tender Securing Declaration.
2. We accept that we will automatically be suspended from being eligible for bidding in any contract with KALRO for the period of time of two years starting on August 2015, if we are in breach of our obligation(s) under the bid conditions, because we:
 - (a) have withdrawn our Bid during the period of bid validity specified by us in the Bidding Data Sheet; or
 - (b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Tenderers.
3. We understand this Tender Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.
4. We understand that if we are a Joint Venture, the Tender Securing Declaration must be in the name of the Joint Venture that submits the bid. If the Joint Venture has not been legally constituted at the time of bidding, the Tender Securing Declaration shall be in the names of all future partners as named in the letter of intent.

Signed:
(Designation)

Name:

Duly authorized to sign the bid for and on behalf of :.....
(Bidder)

Dated on _____ day of _____, _____ *[insert date of signing]*