

# THIKA WATER AND SEWERAGE COMPANY LIMITED (THIWASCO)

# TENDER NO: THIWASCO/015/MPGEE/2023-2024

# SERVICE & MAINTENANCE OF PUMPS, MOTORS ,GENERATORS AND OTHER ELECTRO-MECHANICAL EQUIPMENT

# FRAMEWORK CONTRACT

MANAGING DIRECTOR THIKA WATER AND SEWERAGE COMPANY LTD, P.O. BOX 6103 - 00100, THIKA – KENYA.

# **NOVEMBER 2023**

CLOSING DATE Thursday, December 7, 2023 At 10.00AM

# **INVITATION TO TENDER**

# PROCURING ENTITY: THIKA WATER AND SEWERAGE COMPANY LTD (THIWASCO), P.O. BOX 6103-01000 THIKA.

#### CONTRACT NAME AND DESCRIPTION: SERVICE & MAINTENANCE OF PUMPS, MOTORS GENERATORS AND OTHER ELECTRO-MECHANICAL EQUIPMENT(THIWASCO/015/MPGEE/2023-2024)

- *1.* THIWASCO invites sealed tenders for the Servicing and maintenance of Pumps, Motors and controls.
- 2. Tendering will be conducted under open competitive method National using a standardized tender document. Tendering is open to <u>all qualified and interested Tenderers</u>. Tenders will be awarded on basis of Framework Contract.
- 3. Qualified and interested tenderers may obtain further information and inspect the Tender Documents during office hours [0800 to 1600 hours] at the address given below.
- A complete set of tender documents may be purchased or obtained by interested tenders upon payment of a non- refundable fees of [Kshs.1,000.00] to the following account; Account Name: Thika Water and Sewerage Company Ltd Bank: Equity
   Account No. 0090294932028 Code 027

Tender documents may be obtained electronically from the Website <u>www.thikawater.co.ke</u> Tender documents obtained electronically will be free of charge.

- 5. Tender documents may be viewed and downloaded for free from the website <u>www.thikawater.co.ke</u>. Tenderers who download the tender document must forward their particulars immediately to email; <u>Procurement@thikawater.co.ke</u> ,telephone;0720 418 444 and postal address; P.O. Box 6103-01000 Thika to facilitate any further clarification or addendum.
- 6. All Tenders must be accompanied by a *tender Security* of Kshs.200,000.00
- 7. The Tenderer shall chronologically serialize all pages of the tender documents submitted in the form of 1,2,3,4.....
- 8. Completed tenders must be delivered to the address below on or before [*Thursday 7<sup>th</sup> November 2023 at 10:00am*]. Electronic Tenders will not be permitted.
- 9. Tenders will be opened immediately after the deadline date and time specified above or any deadline date and time specified later. Tenders will be publicly opened in the presence of the Tenderers' designated representatives who choose to attend at the address below.
- 10. Late tenders will be rejected.
- 11. The addresses referred to above are:
  - A. Address for obtaining further information and for purchasing tender documents
    - i. Name of Procuring Entity; Thika Water and Sewerage Company Ltd (THIWASCO)
    - ii. Physical address for hand Courier Delivery to an office or Tender Box (Thika, Head office, Near Blue Post Hotel, Along Haile Selassie Road
    - iii. Postal Address: P.O. Box 6103-01000 Thika
    - iv. Designation, telephone number and e-mail address of the officer to be contacted: **Procurement Department, 0720 418 444, procurement@thikawater.co.ke**

### B. Address for Submission of Tenders.

- 1) Name of Procuring Entity: Thika Water & Sewerage Company Ltd (THIWASCO)
- 2) Postal Address: Managing Director, 6103-01000 Thika
- 3) Physical address for hand Courier Delivery to an office or Tender Box Thika Head Office Near Blue Post Hotel, Along Haile Selassie Road

# C. Address for Opening of Tenders.

- 1) Name of Procuring Entity: Thika Water and Sewerage Company Ltd (THIWASCO)
- 2) Physical address for the location (**Thika**, **Haile Selassie Road**, **Head Office near Blue Post Hotel**)

Name (Official of the Procuring Entity issuing invitation)

# Dr. Moses Kinya

Designation

**Managing Director** 

# **PART 1 - TENDERING PROCEDURES**

# SECTION I - INSTRUCTIONS TO TENDERERS

# A. General

# **1.** Scope of Tender

1.1 This tendering document is for the delivery of Maintenance Services, as specified in Section V, Procuring Entity's Requirements. The name, identification and number of lots (contracts) of this ITT procurement are specified in the **TDS**.

# 2. Definitions

- 2.1 Throughout this tendering document:
  - a) the term "in writing" means communicated in written form (e.g. by mail, e-mail, fax, including if specified in the **TDS**, distributed or received through the electronic-procurement system used by the Procuring Entity) with proof of receipt;
  - b) if the context so requires, "singular" means "plural" and vice versa; and
  - c) "Day" means calendar day, unless otherwise specified as "Business Day". A Business Day is any day that is an official working day of the Procuring Entity. It excludes the Procuring Entity's official public holidays.
- 2.2 The successful Tenderer will be expected to complete the performance of the Services by the Intended Completion Date provided in the contract.

# **3.** Fraud and Corruption

- 3.1 The Procuring Entity requires compliance with the provisions of the Public Procurement and Asset Disposal Act, 2015, Section 62 "Declaration not to engage in corruption". The tender submitted by a person shall include a declaration that the person shall not engage in any corrupt or fraudulent practice and a declaration that the person or his or her sub-contractors are not debarred from participating in public procurement proceedings.
- 3.2 The Procuring Entity requires compliance with the provisions of the Competition Act2 010, regarding collusive practices in contracting. Any tenderer found to have engaged in collusive conduct shall be disqualified and criminal and/or civil sanctions may be imposed. To this effect, Tenders shall be required to complete and sign the "Certificate of Independent Tender Determination" annexed to the Form of Tender.
- 3.3 Unfair Competitive Advantage-Fairness and transparency in the tender process require that the firms or their Affiliates competing for a specific assignment do not derive a competitive advantage from having provided consulting services related to this tender. To that end, the Procuring Entity shall indicate in the **TDS** and make available to all the firms together with this tender document all information that would in that respect give such firm any unfair competitive advantage over competing firms.
- 3.4 Unfair Competitive Advantage Fairness and transparency in the tender process require that the Firms or their Affiliates competing for a specific assignment do not derive a competitive advantage from having provided consulting services related to the contract being tendered for. The Procuring Entity shall indicate in the **TDS** firms (if any) that provided consulting services for the contract being tendered for. The Procuring Entity shall check whether the owners or controllers of the Tenderer are same as those that provided consulting services. The Procuring Entity shall, upon request, make available to any tenderer information that would give such firm unfair competitive advantage over competing firms.
- 3.5 Tenderers shall permit and shall cause their agents (where declared or not), subcontractors, subconsultants, service providers, suppliers, and their personnel, to permit the Procuring Entity to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, tender submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Procuring Entity.

# 4. Eligible Tenderers

- 4.1 A Tenderer may be a firm that is a private entity, a state-owned entity or institution subject to ITT 4.6, or any combination of such entities in the form of an association or subcontracting arrangement or a Joint Venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a Form of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Tendering process and, in the event the JV is awarded the Contract, during contract execution. The maximum number of JV members shall be specified in the **TDS**.
- 4.2 Public Officers of the Procuring Entity, their Spouses, Child, Parent, Brothers or Sister. Child, Parent, Brother or Sister of a Spouse, their business associates or agents and firms/organizations in which they have a substantial or controlling interest shall not be eligible to tender or be awarded a contract. Public Officers are also not allowed to participate in any procurement proceedings.
- 4.3 A Tenderer shall not have a conflict of interest. Any Tenderer found to have a conflict of interest shall be disqualified. A Tenderer may be considered to have a conflict of interest for the purpose of this Tendering process, if the Tenderer:
  - a) Directly or indirectly controls, is controlled by or is under common control with another Tenderer; or
  - b) Receives or has received any direct or indirect subsidy from another Tenderer; or
  - c) Has the same legal representative as another Tenderer; or
  - d) Has a relationship with another Tenderer, directly or through common third parties, that puts it in a position to influence the Tender of another Tenderer, or influence the decisions of the Procuring Entity regarding this Tendering process; or
  - e) Or any of its affiliates participated as a consultant in the preparation of the Procuring Entity's Requirements (including Activities Schedules, Performance Specifications and Drawings) for the Maintenance services that are the subject of the Tender; or
  - f) Or any of its affiliates has been hired (or is proposed to be hired) by the Procuring Entity or Procuring Entity for the Contract implementation; or
  - g) Would be providing goods, works, or maintenance services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the **TDS** ITT 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or
  - h) Has a close business or family relationship with a professional staff of the Procuring Entity or of the project implementing agency, who: (i) are directly or indirectly involved in the preparation of the tendering document or specifications of the contract, and/or the Tender evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Procuring Entity throughout the procurement process and execution of the Contract.
- 4.4 A firm that is a Tenderer (either individually or as a JV member) shall not participate in more than one Tender, except for permitted alternative Tenders. This includes participation as a subcontractor. Such participation shall result in the disqualification of all Tenders in which the firm is involved. A firm that is not a Tenderer or a JV member, may participate as a sub-contractor in more than one Tender.
- 4.5 A Tenderer may have the nationality of any country, subject to the restrictions pursuant to ITT 4.9. A Tenderer shall be deemed to have the nationality of a country if the Tenderer is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or sub-consultants for any part of the Contract including related Services.

- 4.6 A Tenderer that has been sanctioned by PPRA or are under a temporary suspension or a debarment imposed by any other entity of the Government of Kenya, shall be ineligible to be prequalified for, initially selected for, tender for, propose for, or be awarded a contract during such period of sanctioning. The list of debarred firms and individuals is available at the electronic address info@ppra.go.ke.
- 4.7 Tenderers that are state-owned enterprises or institutions in Kenya may be eligible to compete and be awarded a Contract(s) only if they can establish that they: (i) are legally and financially autonomous; (ii) operate under commercial law; and (iii) are not under supervision of the Procuring Entity.
- 4.8 A Tenderer under suspension from tendering as the result of the operation of a Tender-Securing Declaration or Proposal-Securing Declaration shall not be eligible to tender.
- 4.9 Firms and individuals may be ineligible if (a) as a matter of law or official regulations, Kenya prohibits commercial relations with that country, or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Kenya prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.
- 4.10 Foreign tenderers are required to source at least forty (40%) percent of their contract inputs (in supplies, subcontracts and labor) from national suppliers and contractors. To this end, a foreign tenderer shall provide in its tender documentary evidence that this requirement is met. Foreign tenderers not meeting this criterion will be automatically disqualified. Information required to enable the Procuring Entity determine if this condition is met shall be provided in for this purpose is be provided in "SECTION III EVALUATION AND QUALIFICATION CRITERIA, Item 9".
- 4.11 Pursuant to the eligibility requirements of ITT 4.10, a tender is considered a foreign tenderer, if it is registered in Kenya, has less than 51 percent ownership by nationals of Kenya and if it does not subcontract foreign contractors more than 10 percent of the contract price, excluding provisional sums. JVs are considered as foreign tenderers if the individual member firms are registered in Kenya have less 51 percent ownership by nationals of Kenya. The JV shall not subcontract to foreign firms more than 10 percent of the contract price, excluding provisional sums.
- 4.12 TheProcuringEntitymayrequiretendererstoberegisteredwithcertainauthoritiesinKenya.Suchregistr ation shall be defined in the **TDS**, butcaremustbetakentoensuresuchregistrationrequirementdoesnotdiscourage competition, nor exclude competent tenderers. Registration shall not be a condition for tender, but where a selected tenderer is not so registered, the tenderer shall be given opportunity to register before signature of contract.
- 4.13 The Competition Act of Kenya requires that firms wishing to tender as Joint Venture undertakings which may prevent, distort or lessen competition in provision of services are prohibited unless they are exempt in accordance with the provisions of Section 25 of the Competition Act, 2010. JVs will be required to seek for exemption from the Competition Authority. Exemption shall not be a condition for tender, but it shall be a condition of contract award and signature. A JV tenderer shall be given opportunity to seek such exemption as a condition of award and signature of contract. Application for exemption from the Competition Authority of Kenya may be accessed from the website www.cak.go.ke
- 4.14 A Tenderer may be considered ineligible if he/she offers goods, works and production processes with characteristics that have been declared by the relevant national environmental protection agency or by other competent authority as harmful to human beings and to the environment shall not be eligible for procurement.

#### 5. Qualification of the Tenderer

- 5.1 All Tenderers shall provide in Section IV, Tendering Forms, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.
- 5.2 In the event that prequalification of Tenderers has been undertaken as stated in ITT 18.4, the provisions on qualifications of the Section III, Evaluation and Qualification Criteria shall not

apply.

# **B.** Contents of Tendering Document

# 6. Sections of Tendering Document

6.1 The tendering document consists of Parts 1, 2, and 3, which include all the sections indicated below and should be read in conjunction with any Addenda issued in accordance with ITT 9.

# **PART 1: Tendering Procedures**

- i) Section I-Instructions to Tenderers (ITT)
- ii) Section II-Tender Data Sheet (TDS)
- iii) Section III-Evaluation and Qualification Criteria
- iv) Section IV Tendering Forms

# PART 2: Procuring Entity's Requirements

v) Section V- Procuring Entity's Requirements

# **PART 3: Contract**

- vi) Section VI- General Conditions of Contract (GCC)
- vii) Section VII- Special Conditions of Contract (SCC)
- viii) Section VIII- Contract Forms
- 6.2 The Invitation to Tender (ITT) or the notice to prequalify Tenderers, as the case may be, issued by the Procuring Entity is not part of this tendering document.
- 6.3 Unless obtained directly from the Procuring Entity, the Procuring Entity is not responsible for the completeness of the document, responses to requests for clarification, the Minutes of the pre-Tender meeting (if any), or Addenda to the tendering document in accordance with ITT 9. In case of any contradiction, documents obtained directly from the Procuring Entity shall prevail.
- 6.4 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the tendering document and to furnish with its Tender all information or documentation as is required by the tendering document.

# 7. Site Visit

7.1 The Tenderer, at the Tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Required Services and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for the Services. The costs of visiting the Site shall be at the Tenderer's own expense.

# 8. Pre-Tender Meeting and a pre-arranged pretender visit of the site of the works

- 8.1 The Procuring Entity shall specify in the **TDS** if a pre-tender conference will be held, when and where. The Procuring Entity shall also specify in the **TDS** if a pre-arranged pretender visit of the site of the works will be held and when. The Tenderer's designated representative is invited to attend a pre-arranged pretender visit of the site of the works. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 8.2 The Tenderer is requested to submit any questions in writing, to reach the Procuring Entity not later than the period specified in the **TDS** before the meeting.
- 8.3 Minutes of the pre-Tender meeting and the pre-arranged pretender visit of the site of the works, if applicable, including the text of the questions asked by Tenderers and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Tenderers who have acquired the Tender Documents in accordance with ITT 6.3. Minutes shall not identify the source of the questions asked.
- 8.4 The Procuring Entity shall also promptly publish anonymized (no names) Minutes of the pre-

Tender meeting and the pre-arranged pretender visit of the site of the works at the web page identified in the **TDS**. Any modification to the Tender Documents that may become necessary as a result of the pre-Tender meeting shall be made by the Procuring Entity exclusively through the issue of an Addendum pursuant to ITT 10 and not through the minutes of the pre-Tender meeting. Nonattendance at the pre-Tender meeting will not be a cause for disqualification of a Tenderer.

### 9. Clarification of Tender Documents

9.1 A Tenderer requiring any clarification of the Tender Document shall contact the Procuring Entity in writing at the Procuring Entity's address specified in the **TDS** or raise its enquiries during the pre-Tender meeting and the pre-arranged pretender visit of the site of the works if provided for in accordance with ITT 8.4. The Procuring Entity will respond in writing to any request for clarification, provided that such request is received no later than the period specified in the **TDS** prior to the deadline for submission of tenders. The Procuring Entity shall forward copies of its response to all tenderers who have acquired the Tender Documents in accordance with ITT 6.3, including a description of the inquiry but without identifying its source. If so specified in the **TDS**, the Procuring Entity shall also promptly publish its response at the web page identified in the **TDS**. Should the clarification result in changes to the essential elements of the Tender Documents, the Procuring Entity shall amend the Tender Documents appropriately following the procedure under ITT 10.

#### 10. Amendment of Tendering Document

- 10.1 At any time prior to the deadline for submission of Tenders, the Procuring Entity may amend the Tendering document by issuing addenda.
- 10.2 Any addendum issued shall be part of the tendering document and shall be communicated in writing to all who have obtained the tendering document from the Procuring Entity in accordance with ITT 6.3. The Procuring Entity shall also promptly publish the addendum on the Procuring Entity's webpage in accordance with ITT 8.1.
- 10.3 To give prospective Tenderers reasonable time in which to take an addendum into account in preparing their Tenders, the Procuring Entity shall extend, as necessary, the deadline for submission of Tenders, in accordance with ITT 24.2 below.

# C. Preparation of Tenders

#### **11.** Cost of Tendering

11.1 The Tenderer shall bear all costs associated with the preparation and submission of its Tender, and the Procuring Entity shall not be responsible or liable for those costs, regardless of the conduct or outcome of the Tendering process.

#### 12. Language of Tender

12.1 The Tender as well as all correspondence and documents relating to the Tender exchanged by the Tenderer and the Procuring Entity shall be written in the English language. Supporting documents and printed literature that are part of the Tender maybe in another language provided they are accompanied by an accurate translation of the relevant passages into the English language, in which case, for purposes of interpretation of the Tender, such translation shall govern.

# **13.** Documents Comprising the Tender

13.1 The Tender shall comprise the following:

- a) Form of Tender prepared in accordance with ITT 14;
- b) **Schedules:** Schedules or Requirements and priced Activity Schedule completed in accordance with ITT 14 and ITT 16;
- c) Tender Security or Tender-Securing Declaration in accordance with ITT 21.1;
- d) Alternative Tender: if permissible in accordance with ITT 15;
- e) Authorization: written confirmation authorizing the signatory of the Tender to commit the Tenderer,

in accordance with ITT 22.3;

- f) **Qualifications:** documentary evidence in accordance with ITT 19 establishing the Tenderer's qualifications to perform the Contract if its Tender is accepted;
- g) **Tenderer's Eligibility**: documentary evidence in accordance with ITT 19 establishing the Tenderer's eligibility to Tender;
- h) **Conformity**: documentary evidence in accordance with ITT 18, that the Services conform to the tendering document; and
- i) Any other document required in the TDS.
- 13.2 In addition to the requirements under ITT 12.1, Tenders submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a Form of intent to execute a Joint Venture Agreement in the event of a successful Tender shall be signed by all members and submitted with the Tender, together with a copy of the proposed Agreement. The Tenderer shall chronologically serialize pages of all tender documents submitted. The Tenderer shall furnish in the Form of Tender information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Tender.

# 14. Form of Tender and Activity Schedule

14.1 The Form of Tender and priced Activity Schedule shall be prepared using the relevant forms furnished in Section IV, Tendering Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITT 21.3. All blank spaces shall be filled in with the information requested.

# **15.** Alternative Tenders

- 15.1Unless otherwise indicated in the TDS, alternative Tenders shall not be considered. If alternatives are permitted, only the technical alternatives, if any, of the Most Advantageous Tenderer shall be considered by the Procuring Entity.
- 15.2When alternative times for completion are explicitly invited, a statement to that effect will be included in the TDS and the method of evaluating different time schedules will be described in Section III, Evaluation and Qualification Criteria.
- 15.3When specified in the TDS, Tenderers are permitted to submit alternative technical solutions for specified parts of the Services, and such parts will be identified in the TDS, as will the method for their evaluating, and described in Section VII, Procuring Entity's Requirements.

#### **16.** Tender Prices and Discounts

- 16.1The prices and discounts (including any price reduction) quoted by the Tenderer in the Form of Tender and in the Activity Schedule(s) shall conform to the requirements specified below.
- 16.2All lots (contracts) and items must be listed and priced separately in the Activity Schedule(s).
- 16.3The Contract shall be for the Services, as described in Appendix A to the Contract and in the Specifications (or Terms of Reference), based on the priced Activity Schedule, submitted by the Tenderer.
- 16.4The Tenderer shall quote any discounts and indicate the methodology for their application in the Form of Tender in accordance with ITT 13.1.
- 16.5The Tenderer shall fill in rates and prices for all items of the Services described in the in Specifications (or Terms of Reference), and listed in the Activity Schedule in Section VII, Procuring Entity's Requirements. Items for which no rate or price is entered by the Tenderer will not be paid for by the Procuring Entity when executed and shall be deemed covered by the other rates and prices in the Activity Schedule.
- 16.6All duties, taxes, and other levies payable by the Service Provider under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of Tenders, shall be included in the total Tender price submitted by the Tenderer.

- 16.7If provided for in the TDS, the rates and prices quoted by the Tenderer shall be subject to adjustment during the performance of the Contract in accordance with and the provisions of Clause 6.6 of the General Conditions of Contract and/or Special Conditions of Contract. The Tenderer shall submit with the Tender all the information required under the Special Conditions of Contract and of the General Conditions of Contract.
- 16.8For the purpose of determining the remuneration due for additional Services, a breakdown of the lump-sum price shall be provided by the Tenderer in the form of Appendices D and E to the Contract.

# 17. Currencies of Tender and Payment

17 The currency of the Tender and the currency of payments shall be Kenya Shillings.

# **18.** Documents Establishing Conformity of Services

- 18.1 To establish the conformity of the Maintenance services to the tendering document, the Tenderer shall furnish as part of its Tender the documentary evidence that Services provided conform to the technical specifications and standards specified in Section VII, Procuring Entity's Requirements.
- 18.2 Standards for provision of the Maintenance services are intended to be descriptive only and not restrictive. The Tenderer may offer other standards of quality provided that it demonstrates, to the Procuring Entity's satisfaction, that the substitutions ensure substantial equivalence or are superior to those specified in the Section VII, Procuring Entity's Requirements.

# 19. Documents Establishing the Eligibility and Qualifications of the Tenderer

- 19.1 Tenderers shall complete the Form of Tender and all the Tendering Forms included in Section IV to establish their eligibility in accordance with ITT 4.
- 19.2 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 that the Tenderer meets each of the qualification criterion specified in Section III, Evaluation and Qualification Criteria.
- 19.3 In the event that prequalification of Tenderers has been undertaken as stated in the **TDS**, only Tenders from prequalified Tenderers shall be considered for award of Contract. The prequalified Tenderers should submit with their Tenders any information updating their original prequalification applications or, alternatively, confirm in their Tenders that the originally submitted prequalification information remains essentially correct as of the date of Tender submission.
- 19.4 Tenderers shall be asked to provide, as part of the data for qualification, such information, including details of ownership, as shall be required to determine whether, according to the classification established by the Procuring Entity, a Service provider or group of service providers qualifies for a margin of preference. Further the information will enable the Procuring Entity identify any actual or potential conflict of interest in relation to the procurement and/or contract management processes, or a possibility of collusion between tenderers, and there by help to prevent any corrupt influence in relation to the procurement process or contract management.
- 19.5 The purpose of the information described in ITT 18.1 above overrides any claims to confidentiality which a tenderer may have. There can be no circumstances in which it would be justified for a tenderer to keep information relating to its ownership and control confidential where it is tendering to undertake public sector work and receive public sector funds. Thus, confidentiality will not be accepted by the Procuring Entity as a justification for a Tenderer's failure to disclose, or failure to provide required information on its ownership and control.
- 19.6 The Tenderer shall provide further documentary proof, information or authorizations that the Procuring Entity may request in relation to ownership and control which information on any changes to the information which was provided by the tenderer under ITT 6.3. The obligations to require this information shall continue for the duration of the procurement process and contract performance and after completion of the contract, if any change to the information previously provided may reveal a conflict of interest in relation to the award or management of the contract.

- 19.7 All information provided by the tenderer pursuant to these requirements must be complete, current and accurate as at the date of provision to the Procuring Entity. In submitting the information required pursuant to these requirements, the Tenderer shall warrant that the information submitted is complete, current and accurate as at the date of submission to the Procuring Entity.
- 19.8 If a tenderer fails to submit the information required by these requirements, its tenderer will be rejected. Similarly, if the Procuring Entity is unable, after taking reasonable steps, to verify to a reasonable degree the information submitted by a tenderer pursuant to these requirements, then the tender will be rejected.
- 19.9 If information submitted by a tenderer pursuant to these requirements, or obtained by the Procuring Entity (whether through its own enquiries, through notification by the public or otherwise), shows any conflict of interest which could materially and improperly benefit the tenderer in relation to the procurement or contract management process, then:
  - i) If the procurement process is still ongoing, the tenderer will be disqualified from the procurement process,
  - ii) If the contract has been awarded to that tenderer, the contract award will be set aside,
  - iii) The tenderer will be referred to the relevant law enforcement authorities for investigation of whether the tenderer or any other person shave committed any criminal offence.
- 19.10 If a tenderer submits information pursuant to these requirements that is incomplete, inaccurate or outof-date, or attempts to obstruct the verification process, then the consequences ITT 6.7 will ensue unless the tenderer can show to the reasonable satisfaction of the Procuring Entity that any such act was not material, or was due to genuine error which was not attributable to the intentional act, negligence or recklessness of the tenderer.
- 19.11 A Kenyan tenderer shall provide evidence of having fulfilled his/her tax obligations by producing a valid tax compliance certificate or tax exemption certificate issued by the Kenya Revenue Authority.

# **20.** Period of Validity of Tenders

- 20.1 enders shall remain valid for the Tender Validity period specified in the TDS. The Tender Validity period starts from the date fixed for the Tender submission deadline date (as prescribed by the Procuring Entity in accordance with ITT 23.1). A Tender valid for a shorter period shall be rejected by the Procuring Entity as non-responsive.
- 20.2In exceptional circumstances, prior to the expiration of the Tender validity period, the Procuring Entity may request Tenderers to extend the period of validity of their Tenders. The request and the responses shall be made in writing. If a Tender Security is requested in accordance with ITT 20, it shall also be extended for a corresponding period. A Tenderer may refuse the request without forfeiting its Tender Security. A Tenderer granting the request shall not be required or permitted to modify its Tender, except as provided in ITT 19.3.

#### 21. Tender Security

- 21.1 The Tenderer shall furnish as part of its Tender, either a Tender-Securing Declaration or a Tender security, as specified in the TDS, in original form and, in the case of a Tender Security, in the amount and currency specified in the TDS.
- 21.2 A Tender Securing Declaration shall use the form included in Section IV, Tendering Forms.
- 21.3 If a Tender Security is specified pursuant to ITT 20.1, from a reputable source, and an eligible country and shall be in any of the following forms at the Tenderer's option:
  - i) cash;
  - ii) a bank guarantee;
  - iii) a guarantee by an insurance company registered and licensed by the Insurance Regulatory Authority listed by the Authority; or
  - iv) a guarantee issued by a financial institution approved and licensed by the Central Bank of Kenya,

21.4If a Tender Security is specified pursuant to ITT 20.1, any Tender not accompanied by a substantially

responsive Tender Security shall be rejected by the Procuring Entity as non-responsive.

- 21.5If a Tender Security is specified pursuant to ITT 20.1, the Tender Security of unsuccessful Tenderers shall be returned as promptly as possible upon the successful Tenderer's signing the contract and furnishing the Performance Security pursuant to ITT 46.
- 21.6The Tender Security of the successful Tenderer shall be returned as promptly as possible once the successful Tenderer has signed the Contract and furnished the required Performance Security. The Procurement Entity shall also return tender security to the tenderers where;
  - a). The procurement proceedings are terminated
  - b). All tenders were determined non-responsive and
  - c). Where a bidder decline to extent the tender validity period.
- 21.7 The Tender Security may be forfeited or the Tender-Securing Declaration executed:
  - a) if a Tenderer withdraws its Tender during the period of Tender validity specified by the Tenderer in the Form of Tender, or any extension thereto provided by the Tenderer; or
  - b) if the successful Tenderer fails to:
  - i) sign the Contract in accordance with ITT 45; or
  - ii) furnish a performance security in accordance with ITT 46.
- 21.8The Tender Security or Tender-Securing Declaration of a JV must be in the name of the JV that submits the Tender. If the JV has not been legally constituted into a legally enforceable JV at the time of Tendering, the Tender security or Tender-Securing Declaration shall be in the names of all future members as named in the Form of intent referred to in ITT 4.1 and ITT 12.2.
- 21.9If a Tender Security is not required in the **TDS**, pursuant to ITT 20.1, and
  - a) if a Tenderer withdraws its Tender during the period of Tender validity specified by the Tenderer on the Form of Tender; or
  - b) if the successful Tenderer fails to:
    - i) sign the Contract in accordance with ITT 45; or
    - ii) furnish a performance security in accordance with ITT 46;
    - the Procuring Entity may, if provided for **in the TDS**, declare the Tenderer ineligible to be awarded a contract by the Procuring Entity for a period of time as stated **in the TDS**.

# 22. Format and Signing of Tender

- 22.1 The Tenderer shall prepare one original of the documents comprising the Tender as described in ITT 12, bound with the volume containing the Form of Tender, and clearly marked "Original." In addition, the Tenderer shall submit copies of the Tender, in the number specified in the **TDS**, and clearly marked as "Copies." In the event of discrepancy between them, the original shall prevail.
- 22.2 Tenderers shall mark as "CONFIDENTIAL" information in their Tenders which is confidential to their business. This may include proprietary information, trade secrets, or commercial or financially sensitive information.
- 22.3 The original and all copies of the Tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Tenderer. This authorization shall consist of a written confirmation as specified in the TDS and shall be attached to the Tender. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Tender where entries or amendments have been made shall be signed or initialed by the person signing the Tender.
- 22.4 In case the Tenderer is a JV, the Tender shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney

signed by their legally authorized representatives.

22.5 Any inter-lineation, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Tender.

# **D.** Submission and Opening of Tenders

# 23. Sealing and Marking of Tenders

- 23.1 Depending on the sizes or quantities or weight of the tender documents, a tenderer may use an envelope, package or container. The Tenderer shall deliver the Tender in a single sealed envelope, or in a single sealed package, or in a single sealed container bearing the name and Reference number of the Tender, addressed to the Procuring Entity and a warning not to open before the time and date for Tender opening date. Within the single envelope, package or container, the Tenderer shall place the following separate, sealed envelopes:
  - in an envelope or package or container marked "ORIGINAL", all documents comprising the Tender, as described in ITT 11; and
  - in an envelope or package or container marked "COPIES", all required copies of the Tender; and
  - if alternative Tenders are permitted in accordance with ITT 13, and if relevant:
  - i) in an envelope or package or container marked "ORIGINAL –ALTERNATIVE TENDER", the alternative Tender; and
  - ii) in the envelope or package or container marked "COPIES- ALTERNATIVE TENDER", all required copies of the alternative Tender.
- 23.2 The inner envelopes or packages or containers shall:
  - a) bear the name and address of the Procuring Entity.
  - b) bear the name and address of the Tenderer; and
  - c) bear the name and Reference number of the Tender.
- 23.3 If an envelope or package or container is not sealed and marked as required, the *Procuring Entity* will assume no responsibility for the misplacement or premature opening of the Tender. Tenders that are misplaced or opened prematurely will be rejected.

# 24. Deadline for Submission of Tenders

- 24 Tenders must be received by the Procuring Entity at the address and no later than the date and time specified in the **TDS**. When so specified in the **TDS**, Tenderers shall have the option of submitting their Tenders electronically. Tenderers submitting Tenders electronically shall follow the electronic Tender submission procedures specified in the **TDS**.
- 25 The Procuring Entity may, at its discretion, extend the deadline for the submission of Tenders by amending the tendering document in accordance with ITT 9, in which case all rights and obligations of the Procuring Entity and Tenderers previously subject to the deadline shall thereafter be subject to the deadline as extended.

# 25. Late Tenders

25.1 The Procuring Entity shall not consider any Tender that arrives after the deadline for submission of Tenders, in accordance with ITT 23. Any Tender received by the Procuring Entity after the deadline for submission of Tenders shall be declared late, rejected, and returned unopened to the Tenderer.

# 26. Withdrawal, Substitution and Modification of Tenders

26.1 A Tenderer may withdraw, substitute, or modify its Tender after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization (the power of attorney) in accordance with ITT 21.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Tender must accompany the respective written notice. All notices must be:

- 26.2 prepared and submitted in accordance with ITT 21 and ITT 22 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," or "MODIFICATION;" and
- 26.3 received by the Procuring Entity prior to the deadline prescribed for submission of Tenders, in accordance with ITT 23.
- 26.4 Tenders requested to be withdrawn in accordance with ITT 25.1 shall be returned unopened to the Tenderers.
- 26.5 No Tender may be withdrawn, substituted, or modified 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 Form of Tender or any extension thereof.

# 27. Tender Opening

- **27.1** Except as in the cases specified in ITT 23 and ITT 25.2, the Procuring Entity shall, at the Tender opening, publicly open and read out all Tenders received by the deadline at the date, time and place specified **in the TDS** in the presence of Tenderers' designated representatives and anyone who choose to attend. Any specific electronic Tender opening procedures required if electronic tendering is permitted in accordance with ITT 23.1, shall be as specified **in the TDS**.
- 27.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Tender shall not be opened, but returned to the Tenderer. If the withdrawal envelope does not contain a copy of the "power of attorney" confirming the signature as a person duly authorized to sign on behalf of the Tenderer, the corresponding Tender will be opened. No Tender withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Tender opening.
- 27.3 Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Tender being substituted, and the substituted Tender shall not be opened, but returned to the Tenderer. No Tender substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Tender opening.
- 27.4 Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Tender. No Tender modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Tender opening.
- 27.5 Next, all remaining envelopes shall be opened one at a time, reading out: the name of the Tenderer and whether there is a modification; the total Tender Prices, per lot (contract) if applicable, including any discounts and alternative Tenders; the presence or absence of a Tender Security or Tender-Securing Declaration, if required; and any other details as the Procuring Entity may consider appropriate.
- 27.6 Only Tenders, alternative Tenders and discounts that are opened and read out at Tender opening shall be considered further. The Form of Tender and the priced Activity Schedule are to be initialed by representatives of the Procuring Entity attending Tender opening in the manner specified in the **TDS**.
- 27.7 The Procuring Entity shall neither discuss the merits of any Tender nor reject any Tender (except for late Tenders, in accordance with ITT 24.1).
- 27.8 The Procuring Entity shall prepare a record of the Tender opening that shall include, as a minimum:
  - a) The name of the Tenderer and whether there is a withdrawal, substitution, or modification;
  - b) The Tender Price, per lot (contract) if applicable, including any discounts; and
  - c) Any alternative Tenders;
  - d) The presence or absence of a Tender Security or Tender-Securing Declaration, if one was required.
- 27.9 The Tenderers' representatives who are present shall be requested to sign the record. The omission of a Tenderer's signature on the record shall not invalidate the contents and effect of the record. A copy of the opening registers shall be distributed to all Tenderers upon request.

# E. Evaluation and Comparison of Tenders

# 28. Confidentiality

- 28.1 Information relating to the evaluation of Tenders and recommendation of contract award, shall not be disclosed to Tenderers or any other persons not officially concerned with the Tendering process until information on the Intention to Award the Contract is transmitted to all Tenderers in accordance with ITT 41.
- 22.2 Any effort by a Tenderer to influence the Procuring Entity in the evaluation or contract award decisions may result in the rejection of its Tender.
- 28.3 Notwithstanding ITT 27.2, from the time of Tender opening to the time of Contract Award, if any Tenderer wishes to contact the Procuring Entity on any matter related to the Tendering process, it should do so in writing.

# **29** Clarification of Tenders

- 29.1 To assist in the examination, evaluation, and comparison of Tenders, and qualification of the Tenderers, the Procuring Entity may, at the Procuring Entity's discretion, ask any Tenderer for clarification of its Tender including breakdowns of the prices in the Activity Schedule, and other information that the Procuring Entity may require. Any clarification submitted by a Tenderer in respect to its Tender and that is not in response to a request by the Procuring Entity shall not be considered. The Procuring Entity's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease, in the prices or substance of the Tender shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Procuring Entity in the evaluation of the Tenders, in accordance with ITT 32.
- 29.2 If a Tenderer does not provide clarifications of its Tender by the date and time set in the Procuring Entity's request for clarification, its Tender may be rejected.

#### **30** Deviations, Reservations, and Omissions

- 31.1 During the evaluation of Tenders, the following definitions apply:
  - a) "Deviation" is a departure from the requirements specified in the tendering document;
  - b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the tendering document; and
  - c) "Omission" is the failure to submit part or all of the information or documentation required in the tendering document.

#### **31. Determination of Responsiveness**

- 31.1 The Procuring Entity's determination of a Tender's responsiveness is to be based on the contents of the Tender itself, as defined in ITT 12.
- 31.2 A substantially responsive Tender is one that meets the requirements of the tendering document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:
  - a) If accepted, would:
    - i) Affect in any substantial way the scope, quality, or performance of the Maintenance services specified in the Contract; or
    - ii) Limit in any substantial way, inconsistent with the tendering document, the Procuring Entity's rights or the Tenderer's obligations under the Contract; or
  - b) if rectified, would unfairly affect the competitive position of other Tenderers presenting substantially responsive Tenders.
- 31.2 The Procuring Entity shall examine the technical aspects of the Tender submitted in accordance with ITT 17 and ITT18, in particular, to confirm that all requirements of Section VII, Procuring Entity's Requirements have been met without any material deviation or reservation, or omission.
- 31.3 If a Tender is not substantially responsive to the requirements of tendering document, it shall be rejected by the Procuring Entity and may not subsequently be made responsive by correction of the material deviation, reservation, or omission. Non-conformities, Errors and Omissions

- 31.4 Provided that a Tender is substantially responsive, the Procuring Entity may waive any nonconformities in the Tender.
- 31.5 Provided that a Tender is substantially responsive, the Procuring Entity may request that the Tenderer submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial non- conformities or omissions in the Tender related to documentation requirements. Requesting information or documentation on such non-conformities shall not be related to any aspect of the price of the Tender. Failure of the Tenderer to comply with the request may result in the rejection of its Tender.
- 31.6 Provided that a Tender is substantially responsive, the Procuring Entity shall rectify quantifiable non material non-conformities related to the Tender Price. To this effect, the Tender Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component in the manner specified in the **TDS**.

# **32.** Arithmetical Errors

- 32.1 Corrected tender prices shall not be used in the evaluation of tenders, comparison of tender prices.
- 32.2 The tender sum as submitted and read out during the tender opening shall be absolute and final and shall not be the subject of correction, adjustment or amendment in anyway by any person or entity.
- 32.3 Provided that the Tender is substantially responsive, the Procuring Entity shall handle errors on the following basis:
  - a) Any error detected if considered a major deviation that affects the substance of the tender, shall lead to disqualification of the tender as non-responsive.
  - b) Any errors in the submitted tender arising from a miscalculation of unit price, quantity, subtotal and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive. and
  - c) If there is a discrepancy between words and figures, the amount in words shall prevail,

#### **33.** Conversion to Single Currency

33.1 For evaluation and comparison purposes, conversion of the currency (ies) of to a single currency preference shall not apply.

#### 34. Margin of Preference

- 34.1 Margin of preference on local service providers may be allowed if it is deemed that the services require participation of foreign tenderers. If so allowed, it will be indicated in the **TDS**.
- 34.2 Where it is intended to reserve the contract to specific groups under Small and Medium Enterprises, or enterprise of women, youth and/or persons living with disability, who are appropriately registered as such by the authority to be specified in the **TDS**, a procuring entity shall ensure that the invitation to tender specifically indicates that only businesses/firms belonging to the specified group are eligible to tender as specified in the **TDS**. Otherwise if not so stated, the invitation will be open to all tenderers.

#### **35. Evaluation of Tenders**

- 35.1 The Procuring Entity shall use the criteria and methodologies listed in this ITT and Section III, Evaluation and Qualification Criteria. No other evaluation criteria or methodologies shall be permitted. By applying the criteria and methodologies, the Procuring Entity shall determine the Most Advantageous Tender. This is the Tender of the Tenderer that meets the qualification criteria and whose Tender has been determined to be:
  - a) Substantially responsive to the tendering document; and
  - b) The lowest evaluated cost.

- 35.2 In evaluating the Tenders, the Procuring Entity will determine for each Tender the evaluated Tender cost by adjusting the Tender price as follows:
  - a) Price adjustment due to discounts offered in accordance with ITT 15.4;
  - b) converting the amount resulting from applying (a) and (b) above, if relevant, to a single currency in accordance with ITT 33;
  - c) price adjustment due to quantifiable nonmaterial non-conformities in accordance with ITT 31.3;
  - d) The additional evaluation factors are specified in Section III, Evaluation and Qualification Criteria.
- 35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be considered in Tender evaluation.
- 35.4 In the case of multiple contracts or lots, Tenderers are allowed to tender for one or more lots and the methodology to determine the lowest evaluated cost of the lot (contract) and for combinations, including any discounts offered in the Form of Tender, is specified in Section III, Evaluation and Qualification Criteria.

# **36.** Comparison of Tenders

36.1 The Procuring Entity shall compare the evaluated costs of all substantially responsive Tenders established in accordance with ITT 35.2 to determine the Tender that has the lowest evaluated cost.

# **37.** Abnormally Low Tenders and Abnormally High

#### **Tenders Abnormally Low Tenders**

- 37.1 An Abnormally Low Tender is one where the Tender price, in combination with other elements of the Tender, appears so low that it raises material concerns as to the capability of the Tenderer in regards to the Tenderer's ability to perform the Contract for the offered Tender Price or that genuine competition between Tenderers is compromised.
- 37.2 In the event of identification of a potentially Abnormally Low Tender, the Procuring Entity shall seek written clarifications from the Tenderer, including detailed price analyses of its Tender price in relation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any other requirements of the Tender document.
- 37.3 After evaluation of the price analyses, in the event that the Procuring Entity determines that the Tenderer has failed to demonstrate its capability to perform the Contract for the offered Tender Price, the Procuring Entity shall reject the Tender.

#### **Abnormally High Tenders**

- 37.4 An abnormally high tender price is one where the tender price, in combination with other constituent elements of the Tender, appears unreasonably too high to the extent that the Procuring Entity is concerned that it (the Procuring Entity) may not be getting value for money or it may be paying too high a price for the contract compared with market prices or that genuine competition between Tenderers is compromised.
- 37.5 In case of an abnormally high tenders, the Procurement Entity should (a) review the specifications, and conditions of tender, or correctness of the estimate or (b) possibility of a collusion, formation of cartels, or other form of fraudulent and corrupt activity in the tendering processor (c) perception of the firms on the credibility of the Procuring Entity. The Procuring Entity shall treat abnormally low and high tenders in accordance with procedures provided for in this tender document
- 37.6 If the Procuring Entity determines that the Tender Price is abnormally too high because genuine competition between tenderers is compromised (often due to collusion, corruption or other manipulations), the Procuring Entity shall reject all Tenders and shall institute or cause competent Government Agencies to institute an investigation on the cause of the compromise, before retendering.

### 38. Unbalanced and/or Front-Loaded Tenders

- 38.1 If in the Procuring Entity's opinion, the Tender that is evaluated as the lowest evaluated price is seriously unbalanced and/or front loaded, the Procuring Entity may require the Tenderer to provide written clarifications. Clarifications may include detailed price analyses to demonstrate the consistency of the tender prices with the scope of works, proposed methodology, schedule and any other requirements of the Tender document.
- 38.2 After the evaluation of the information and detailed price analyses presented by the Tenderer, the Procuring Entity may as appropriate:
  - a) Accept the Tender; or
  - b) Require that the total amount of the Performance Security be increased at the expense of the Tenderer to a level not exceeding a 30% of the Contract Price; or
  - c) agree on a payment mode that eliminates the inherent risk of the Procuring Entity paying too much for undelivered works; or
  - d) reject the Tender.

# **39.** Qualification of the Tenderer

- 39.1The Procuring Entity shall determine to its satisfaction whether the Tenderer that is selected as having submitted the lowest evaluated cost and substantially responsive Tender is eligible and meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.
- 39.1 The determination shall be based upon an examination of the documentary evidence of the Tenderer's qualifications submitted by the Tenderer, pursuant to ITT18. The determination shall not take into consideration the qualifications of other firms such as the Tenderer's subsidiaries, parent entities, affiliates, subcontractors or any other firm(s) different from the Tenderer that submitted the Tender.
- 39.2 An affirmative determination shall be a prerequisite for award of the Contract to the Tenderer. A negative determination shall result in disqualification of the Tender, in which event the Procuring Entity shall proceed to the TendererwhooffersasubstantiallyresponsiveTenderwiththenextlowestevaluatedcosttomakeasimilar determination of that Tenderer's qualifications to perform satisfactorily.

# 40 Procuring Entity's Right to Accept Any Tender, and to Reject Any or All Tenders

40.1 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 Tenderers. In case of annulment, all Tenders submitted and specifically, Tender securities, shall be promptly returned to the Tenderers.

# F. Award of Contract

# 41 Award Criteria

41.1 The Procuring Entity shall award the Contract to the successful tenderer whose tender has been determined to be the Lowest Evaluated Tender.

#### 42. Notice of Intention to enter into a Contract/Notification of award

- 42.1 Upon award of the contract and Prior to the expiry of the Tender Validity Period the Procuring Entity shall issue a <u>Notification of Intention to Enter in to a Contract</u>/Notification of award to all tenderers which shall contain, at a minimum, the following information:
  - a) The name and address of the Tenderer submitting the successful tender;
  - b) The Contract price of the successful tender;
  - c) a statement of the reason(s) the tender of the unsuccessful tenderer to whom the letter is addressed was unsuccessful, unless the price information in (c) above already reveals the reason;
  - d) the expiry date of the Stand still Period; and

e) instructions on how to request a debriefing and/or submit a complaint during the standstill period;

# 43. Standstill Period

- 43.1 The Contract shall not be signed earlier than the expiry of a Standstill Period of 14 days to allow any dissatisfied tender to launch a complaint. Where only one Tender is submitted, the Standstill Period shall not apply.
- 43.2 Where a Standstill Period applies, it shall commence when the Procuring Entity has transmitted to each Tenderer the Notification of Intention to Enter into a Contract with the successful Tenderer.

### 44. Debriefing by the Procuring Entity

44.1 On receipt of the Procuring Entity's <u>Notification of Intention to Enter into a Contract</u> referred to in ITT 43, an unsuccessful tenderer may make a written request to the Procuring Entity for a debriefing on specific issues or concerns regarding their tender. The Procuring Entity shall provide the debriefing within five days of receipt of the request. .2 Debriefings of unsuccessful Tenderers may be done in writing or verbally. The Tenderer shall bear its own costs of attending such a debriefing meeting.

# 45. Letter of Award

45.1 Prior to the expiry of the Tender Validity Period and upon expiry of the Standstill Period specified in ITT 42.1, upon addressing a complaint that has been filed within the Standstill Period, the Procuring Entity shall transmit the Letter of Award to the successful Tenderer. The letter of award shall request the successful tenderer to furnish the Performance Security within 21 days of the date of the letter.

#### 46. Signing of Contract

- 46.1 Upon the expiry of the fourteen days of the Notification of Intention to enter into contract and upon the parties meeting their respective statutory requirements, the Procuring Entity shall send the successful Tenderer the Framework agreement.
- 46.2 Within fourteen (14) days of receipt of the Framework agreement, the successful Tenderer shall sign, date, and return it to the Procuring Entity.
- 46.3 The written contract shall be entered into within the period specified in the notification of award and before expiry of the tender validity period.

#### **47. Performance Security**

- 47.1 Within twenty-one (21) days of the receipt of the Form of Acceptance from the Procuring Entity, the successful Tenderer, if required, shall furnish the Performance Security in accordance with the GCC 3.9, using for that purpose the Performance Security Form included in Section X, Contract Forms, or another Form acceptable to the Procuring Entity. If the Performance Security furnished by the successful Tenderer is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Tenderer to be acceptable to the Procuring Entity. A foreign institution providing a bond shall have a correspondent financial institution located in Kenya, unless the Procuring Entity has agreed in writing that a correspondent financial institution is not required.
- 47.2 Failure of the successful Tenderer to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security. In that event the Procuring Entity may award the Contract to the Tenderer offering the next Most Advantageous Tender.

#### **48.** Publication of Procurement Contract

- 48.1 Within fourteen days after signing the contract, the Procuring Entity shall publish the awarded contract at its notice boards and websites; and on the Website of the Authority. At the minimum, the notice shall contain the following information:
  - a) Name and address of the Procuring Entity;

- b) name and reference number of the contract being awarded, a summary of its scope and the selection method used;
- c) the name of the successful Tenderer, the final total contract price, the contract duration.
- d) Dates of signature, commencement and completion of contract;
- e) Names of all Tenderers that submitted Tenders, and their Tender prices as read out at Tender opening.

### 49. Adjudicator

49.1 The Procuring Entity proposes the person named **in the TDS** to be appointed as Adjudicator under the Contract, at an hourly fee specified **in the TDS**, plus reimbursable expenses. If the Tenderer disagrees with the proposed Adjudicator, the Tenderer should so state in the Tender. If, in the Form of Acceptance, the Procuring Entity has not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed by the Appointing Authority designated in the Special Conditions of Contract at the request of either party.

# 50. Procurement Related Complaints and Administrative Review

- 50.1 The procedures for making a Procurement-related Complaint areas specified in the TDS.
- 50.2 A request for administrative review shall be made in the form provided under contract forms.

# SECTION II - TENDER DATA SHEET (TDS)

The following specific data for the Maintenance Services to be procured shall complement, supplement, or amend the provisions in the Instructions to Tenderers (ITT). Whenever there is a conflict, the provisions herein shall prevail over those in ITT.

<b>Reference to ITC</b> Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS		
ITT Reference	A. General		
ITT 1.1	The reference number of the Request for Tenders (ITT) is: [THIWASCO/015/MPGEE/2022-2023]		
	The Procuring Entity is: Thika Water and Sewerage Company Ltd		
	The name of the ITT is: Servicing & Maintenance of Pumps, Motors, Generators and other Electro-Mechanical Equipment		
ITT 2.1	The Procuring Entity is: Thika Water and Sewerage Company Ltd (THIWASCO)		
	The name of the Project is: Servicing & Maintenance of Pumps, Motors, Generators and other Electro-Mechanical Equipment.		
3.4	The firms (if any) that provided consulting services for the contract being tendered for are; <b>non-Provided</b>		
ITT 4.1	Maximum number of members in the Joint Venture (JV) shall be: two		
ITT 4.12	The Procuring Entity may require tenderers to be registered with: Not Applicable		
	B. Contents of Tendering Document		
ITT 8.1	For <b><u>Clarification of Tender purposes</u></b> only, the Procuring Entity's address is:		
	same as that specified under provision ITT 1.1 for Tender submission		
	Requests for clarification should be received by the Procuring Entity no later than: [28 <sup>th</sup> November 2023 at 5:00pm] Web page: www.thikawater.co.ke		
ITT 8.2	The Firms or their Affiliates that provided consulting services for the contract being tendered for are: <b>Non-Provided</b>		
ITT 8.4	The Procuring Entity shall publish Minutes of the pre-Tender meeting and the pre-arranged pretender visit of the site of the works at the website: <b>Not Applicable</b>		
ITT 9.1	The Procuring Entity will respond to request for clarification in 2days .		
	shall publish its response at the website: www.thikawater.co.ke		
	C. Preparation of Tenders		
ITT 13.1 (i)	The Tenderer shall submit the following additional documents in its Tender: As per the evaluation criteria set		
ITT 15.1	Alternative Tenders shall not be considered.		
	[If alternatives shall be considered, the methodology shall be defined in Section III, Evaluation and Qualification Criteria. See Section III for further details]		

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS	
ITT 15.2	Alternative times for completion <b>shall not be</b> permitted. If permitted, the range of acceptable completion time is: <b>Not Applicable</b>	
ITT 15.3	Alternative technical solutions shall be permitted for the following parts of the Services: <b>Not Permitted</b>	
ITT 16.7	The prices quoted by the Tenderer <b>shall not</b> be subject to adjustment during the performance of the Contract.	
ITT 19.3	Prequalification has not been undertaken.	
ITT 20.1	The Tender validity period shall be 182 days.	
ITT 21.1	A Tender Security <b>shall be</b> required. A Tender-Securing Declaration <b>shall not be</b> required. If a Tender Security shall be required, the amount and currency of the Tender Security shall be <b>Kshs.200,000.00</b>	
ITT 22.1	In addition to the original of the Tender, the number of copies is: <b>Tenderer shall submit one</b> original document and a copy totaling to two.	
ITT 22.3	The written confirmation of authorization to sign on behalf of the Tenderer shall consist of: <u>a</u> <u>letter of power of attorney giving authority to sign on behalf of the tenderer</u>	
	D. Submission and Opening of Tenders	
ITT 23.1	For <u>Tender submission purposes</u> only, the Procuring Entity's address is: Attention: Managing Director Postal Address: P.O. Box 6103-01000 Thika Physical Address: Thika Head Office, Near Blue Post Hotel, Along Haile Selassie road.	
ITT 24.1	The deadline for Tender submission is:         Date: [Thursday,7 <sup>th</sup> December 2023]         Time: [ 10:00 a.m.]         Tenderers shall not have the option of submitting their Tenders electronically.	
ITT 26.1	The Tender opening shall take place at: Physical Address: <b>Thika Main Offices. near Blue Post Hotel, Along Haile Selassie Road</b> <b>Thika.</b> Attention: <b>Managing Director</b> Postal Address: <b>P.O. Box 6103-01000 Thika</b> Physical Address: Date: [ <i>Thursday</i> ,7 <sup>th</sup> December 2023] Time: [ 10:00 a.m.]	
ITT 27.6	The Form of Tender and priced Activity Schedule shall be initialed by representatives of the Procuring Entity conducting Tender opening: Each Tender shall be initialed by all representatives on the first page, the form of tender and the schedule of requirement pages and shall be numbered.	

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
ITT 31.7	The Procuring Entity shall adjust the Tender Price for comparison purposes only in the following manner; <b>Not Applicable</b>
E. Evaluation and	d Comparison of Tenders
ITT 34.1	Margin of preference -kenyan citizens
ITT 34.2	The invitation to tender is extended to the following group that qualify for Reservations: <b>open to all interested eligible bidders</b>
F. Award of Con	tract
Award shall be ma range.	de to the lowest evaluated most responsive bidder with quoted prices which are within the market
Any arithmetic err tender	or shall lead to automatic disqualification for it will be termed as a major deviation to the
ITT 49.1	The Adjudicator proposed by the Procuring Entity is as appointed by the Appointing Authority at the request of either party.
ITT 50.1	The procedures for making a Procurement-related Complaint are available from the "Notification of Intention to Award - Paragraph 5" and from the PPRA website <u>www.ppra.go.ke</u> . If a Tenderer wishes to make a Procurement-related Complaint, the Tenderer should submit its complaint following these procedures, in writing (by the quickest means available, that is either by hand delivery or email to: For the attention: <b>Dr. Moses Kinya</b> Titla/position: <b>Managing Director</b>
	Title/position: Managing Director
	Procuring Entity: Thika Water and Sewerage Company Ltd
	Email address: thikawater.co.ke
	In summary, a Procurement-related Complaint may challenge any of the following:
	<ul><li>(i) the terms of the Tender Documents; and</li><li>(ii) the Procuring Entity's decision to award the contract.</li></ul>

# **SECTION III – EVALUATION AND QUALIFICATION CRITERIA**

Particulars to the appendix of evaluation and qualification criteria below shall be used to determine the lowest evaluated responsive bidder who shall be awarded the contract;

Particu	Particulars of appendix to evaluation and qualification criteria			
	Mandatory Eligibility criteria	Responsiveness	Not responsive	
1.	Provide copy of Company incorporation / Registration Certificate.			
2.	Must submit a dully signed and stamped price schedule			
3.	Fully filled, signed and stamped form of tender in the format provided			
4.	Duly filled, signed and stamped confidential business questionnaire in the format provided			
5.	Attach original bid security of <b>kshs.200,000.00</b> from a financial institution approved by PPRA.			
6.	Attach relevant Valid Tax Compliance			
7.	Proof of physical address inform of a lease/tenancy agreement, proof of ownership or current payment receipt.			
8.	Attach a valid business permit			
9.	Attach valid upto date CR12 /Partnership deed			
10.	Attach Copies of IDs of Directors			
11.	Serialize every page of your documents from page 1 to the last page chronoligally in the form of 1,2,3,4			
12.	Bid documents must be submitted in two copies marked "original and Copy"			
13.	No consistent history of court/arbitral award decisions against the tenderer in he last 12 months-Provide proof			
14.	Fill, sign and stamp tender declaration forms in the format provided.			
	Note: Noncompliance with any MANDATORY requirement willa disqualification	utomatically resu	llt in	

# **B. PRELIMINARY TECHNICAL EVALUATION CRITERIA**

		Marks	Indicate reference no. where evidence is provided.
1.	Submission of audited financial statements for the last three (3) years to demonstrate the current soundness of the tenderer's firm financial position and its long-term profitability- <b>Compete form FIN 3.1 with attachments.</b>	15marks	

2.	Financial Strength: Submit certified Audited Accounts for the last	12marks	
	three years ( <b>3marks</b> )		
	- Return on asset (ROA) of from 5% (3marks)		
	Solvency Ratio i.e. Debts to Assets Ratio – acceptable threshold shall be a maximum of 2 ( $3$ morkg)		
	De a maximum of 2. (Jinarks) Current Patio i a Current Assats to Current Lightitias Patio the		
	acceptable threshold shall be a minimum of 1. Coverage Ratio i.e. Net		
	I jouid Assets to		
	Outstanding Ratio – the acceptable threshold shall be a minimum of		
	1( <b>3marks</b>		
3.	Provide letter of authority to seek references from tenderer's bank	8marks	
	(Letters addressed to specific bank giving authority to the client to		
	verify bank statements).		
4.	Proof of 3 works of similar magnitude in repairs and maintenance of	20marks	
	pumping systems undertaken in the last 5 years. Attach copies of		
	completion certificates, references, LPOs/LSOs/Contracts as		
	evidence.		
	5million& above 20marks		
	3-4million-15mrks		
	1-2million-7mrks		
	Below 1 million-2mrks		
5.	Attach CVs and relevant certifications of mechanical & electrical	20marks	
	technicians to be involved in the repairs and maintenance of		
	equipment. Complete form PER 1 and from PER 2		
6	Attach brochures/datasheets/catalogues of proposed spares (bearings	20marks	
0.	couplings, gland packings) to be provided in the maintenance	Zomarks	
	contract.		
7.	Attach evidence of non-performance in contracts – Duly fill, sign and	5marks	
	stamp form CON-2		
	Total Marks	100	
To			
cor	note: Tenders that pass the preliminary technical examination will be fur	ther subjected to arithmetical	
cor	note: Tenders that pass the preliminary technical examination will be fur rections	ther subjected to arithmetical	
cor i.	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted	ther subjected to arithmetical	
cor i. ii.	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted	ther subjected to arithmetical	
cor i. ii. iii.	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted	ther subjected to arithmetical	
i. ii. iii. Not	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted Permitted	ther subjected to arithmetical	
i. ii. iii. Not Not	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted Permitted Permitted	ther subjected to arithmetical	
i. ii. iii. Not Not Mat	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted Permitted Permitted rgin of preference :Kenyan citizens	ther subjected to arithmetical	
i. ii. iii. Not Not Man Ten	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted Permitted Permitted rgin of preference :Kenyan citizens der will not be subjected to post qualification criteria	ther subjected to arithmetical	
<ul> <li>corr</li> <li>i.</li> <li>ii.</li> <li>iii.</li> <li>Not</li> <li>Not</li> <li>Man</li> <li>Ten</li> <li>The</li> </ul>	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted Permitted Permitted rgin of preference :Kenyan citizens der will not be subjected to post qualification criteria last one year	ther subjected to arithmetical	
corr i. iii. iii. Not Not Ten The The	note: Tenders that pass the preliminary technical examination will be fur rections Alternative completion times; Not Permitted Alternative Technical Solution: Not Permitted Other Criteria: Not Permitted Permitted Permitted rgin of preference :Kenyan citizens der will not be subjected to post qualification criteria last one year last one year	ther subjected to arithmetical	

# **SECTION IV - TENDERING FORMS**

#### 1. FORM OF TENDER

#### (Amended and issued pursuant to PPRA CIRCULAR No. 02/2022)

### **INSTRUCTIONS TO TENDERERS**

i) All italicized text is to help the Tenderer in preparing this form.

*ii)* The Tenderer must prepare this Form of Tender on stationery with its letterhead clearly showing the Tenderer's complete name and business address. Tenderers are reminded that this is a mandatory requirement.

*iii)Tenderer must complete and sign CERTIFICATE OF INDEPENDENT TENDER DETERMINATION and the SELF DECLARATION FORMS OF THE TENDERER as listed under (s) below.* 

Date of this Tender submission:...........[insert date (as day, month and year) of Tender submission]

To: ..... [Insert complete name of Procuring Entity]

- a) **No reservations:** We have examined and have no reservations to the tendering document, including Addenda issued in accordance with ITT 9;
- b) Eligibility: We meet the eligibility requirements and have no conflict of interest in accordance with ITT 4;
- c) **Tender-Securing Declaration:** We have not been suspended nor declared ineligible by the Procuring Entity based on execution of a Tender-Securing Declaration or Proposal-Securing Declaration in Kenya in accordance with ITT 4.7;
- *d)* **Conformity:** We offer to provide the Maintenance services in conformity with the tendering document of the following: *[insert a brief description of the Maintenance services];*
- *e)* **Tender Price:** The total price of our Tender, excluding any discounts offered in item (f) below is: *[Insert one of the options below as appropriate]*

In case of multiple Service Lines or Service Packages (a) Total price of each Service Line or Package [*insert the total price of each in words and figures, indicating the various amounts and the respective currencies*]; and (b) Total price of all Service Lines and Packages [*insert the total price in words and figures, indicating the various amounts and the respective currencies*];

- f) **Discounts:** The discounts offered and the methodology for their application are:
  - *i)* The discounts offered are: [Specify in detail each discount offered.]
  - ii) The exact method of calculations to determine the net price after application of discounts is shown below: [Specify in detail the method that shall be used to apply the discounts];
- g) **Tender Validity Period:** Our Tender shall be valid for the period specified in TDS 19.1 (as amended if applicable) from the date fixed for the Tender submission deadline (specified in TDS 23.1 (as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- h) **Performance Security:** If our Tender is accepted, we commit to obtain a Performance Security in accordance with the tendering document;
- i) **One Tender Per Tenderer:** We are not submitting any other Tender (s) as an individual Tenderer, and we are not participating in any other Tender (s) as a Joint Venture member or as a subcontractor, and

meet the requirements of ITT 4.3, other than alternative Tenders submitted in accordance with ITT 14;

- j) Suspension and Debarment: We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the PPRA. Further, we are not ineligible under Kenya's official regulations or pursuant to a decision of the United Nations Security Council;
- *k)* **State-owned enterprise or institution**: [select the appropriate option and delete the other] [We are not a state- owned enterprise or institution]/[We are a state-owned enterprise or institution but meet the requirements of ITT 4.6];
- *l)* **Commissions, gratuities and fees**: We have paid, or will pay the following commissions, gratuities, or fees with respect to the Tendering process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity].*

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate "none.")

[Delete if not appropriate, or amend to suit] We confirm that we understand the provisions relating to Standstill Period as described in this tendering document and the Procurement Regulations.

- m) **Binding Contract**: We understand that this Tender, together with your written acceptance thereof included in your Form of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- n) **Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Tender, the Most Advantageous Tender or any other Tender that you may receive; and
- o) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption.
- p) **Collusive practices**: We hereby certify and confirm that the tender is genuine, non-collusive and made with the intention of accepting the contract if awarded. To this effect we have signed the "Certificate of Independent Tender Determination" attached below.
- q) **Code of Ethical Conduct:** We undertake to adhere by the Code of Ethical Conduct for Suppliers, Contractors and Service Providers, copy available from *(specify website)* during the procurement process and the execution of any resulting contract.
- r) **Beneficial Ownership Information:** We commit to provide to the procuring entity the Beneficial Ownership Information in conformity with the Beneficial Ownership Disclosure Form upon receipt of notification of intention to enter into a contract in the event we are the successful tenderer in this subject procurement proceeding.
- s) We, the Tenderer, have duly completed, signed and stamped the following Forms as part of our Tender:
  - a) Tenderer's Eligibility; Confidential Business Questionnaire to establish we are not in any conflict to interest.
  - b) Certificate of Independent Tender Determination to declare that we completed the tender without colluding with other tenderers.
  - c) Self-Declaration of the Tenderer- to declare that we will, if awarded a contract, not engage in any form of fraud and corruption.

Further, we confirm that we have read and understood the full content and scope of fraud and corruption as informed in

"Appendix 1- Fraud and Corruption" attached to the Form of Tender.

Name of the Tenderer: \*.....[insert complete name of person signing the Tender]

**Name of the person duly authorized to sign the Tender on behalf of the Tenderer**: .......\*\*[insert complete name of person duly authorized to sign the Tender]

Signature of the person named above: ..........[insert signature of person whose name and capacity are

shown above] Date signed......[insert date of signing] day of.....[insert month], [insert

year]

# i) TENDERER'S ELIGIBILITY- CONFIDENTIAL BUSINESS QUESTIONNAIRE

#### **Instruction to Tenderer**

Tender is instructed to complete the particulars required in this Form, *one form for each entity if Tender is a JV*. Tenderer is further reminded that it is an offence to give false information on this Form.

#### a) Tenderer's details

	ITEM	DESCRIPTION
1	Name of the Procuring Entity	
2	Reference Number of the Tender	
3	Date and Time of Tender Opening	
4	Name of the Tenderer	
5	Full Address and Contact Details of the Tenderer.	<ol> <li>Country</li> <li>City</li> <li>Location</li> <li>Building</li> <li>Floor</li> <li>Postal Address</li> <li>Name and email of contact person</li> </ol>
		8. Phone no of the contact person
6	Current Trade License Registration Number and Expiring date	*
7	Name, country and full address (postal and physical addresses, email, and telephone number) of Registering Body/Agency	
8	Description of Nature of Business	
9	Maximum value of business which the Tenderer handles.	
10	State if Tenders Company is listed in stock exchange, give name and full address ( <i>postal and physical</i> <i>addresses, email, and telephone</i> <i>number</i> ) of state which stock exchange	

#### **General and Specific Details**

#### **Sole Proprietor,** provide the following details. b)

Name in full\_\_\_\_\_Age\_\_ Nationality\_\_\_\_

\_\_\_\_\_Country of Origin\_ Citizenship \_\_\_\_

#### C) **Partnership**, provide the following details

	Names of Partners	Nationality	Citizenship	% Shares owned
1				
2				
3				

# d) **Registered Company,** provide the following details.

- i) Private or public Company
- ii) State the nominal and issued capital of the Company: -

Nominal Kenya Shillings (Equivalent) Issued Kenya Shillings (Equivalent)

iii) Give details of Directors as follows.

	Names of Director	Nationality	Citizenship	% Shares owned
1				
2				
3				

# (e) **DISCLOSURE OF INTEREST-Interest of the Firm in the Procuring Entity.**

If yes, provide details as follows.

	Names of Person	Designation in the Procuring Entity	Interest or Relationship with Tenderer
1			
2			
3			

# ii) Conflict of interest disclosure

	Type of Conflict	Disclosure	If YES provide details of the relationship
		YES OR NO	with Tenderer
1	Tenderer is directly or indirectly controlled by		
	or is under common control with another		
	tenderer.		
2	Tenderer receives or has received any direct or		
	indirect subsidy from another tenderer.		
3	Tenderer has the same legal representative as		
	another tenderer		
4	Tender has a relationship with another		
	tenderer, directly or through common third		
	parties, that puts it in a position to influence the		
	tender of another tenderer, or influence the		
	decisions of the Procuring Entity regarding this		
	tendering process.		
5	Any of the Tenderer's affiliates participated as		
	a consultant in the preparation of the design or		
	technical specifications of the works that are		
	the subject of the tender.		
6	Tenderer would be providing goods, works,		
	non-consulting services or consulting services		
	during implementation of the contract specified		
	in this Tender Document.		
7	Tenderer has a close business or family		
	relationship with a professional staff of the		
	Procuring Entity who are directly or indirectly		

	Type of Conflict	Disclosure	If YES provide details of the relationship
		YES OR NO	with Tenderer
	involved in the preparation of the Tender		
	document or specifications of the Contract,		
	and/or the Tender evaluation process of such		
	contract.		
8	Tenderer has a close business or family		
	relationship with a professional staff of the		
	Procuring Entity who would be involved in		
	the implementation or supervision of the such		
	Contract.		
9	Has the conflict stemming from such		
	relationship stated in item 7 and 8 above been		
	resolved in a manner acceptable to the		
	Procuring Entity throughout the tendering		
	process and execution of the Contract.		

# f) Certification

On behalf of the Tenderer, I certify that the information given above is complete, current and accurate as at the date of submission.

Full Name

Title or Designation\_\_\_\_\_

(Signature)

(Date)

# ii) CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting the accompanying Letter of Tender to the \_\_\_\_\_\_[Name of Procuring Entity] for:\_[Name and number of tender] in response to the request for tenders made by:\_\_\_\_\_\_[Name of Tenderer] do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of [Name of Tenderer] that:

- 1. I have read and I understand the contents of this Certificate;
- 2. I understand that the Tender will be disqualified if this Certificate is found not to be true and complete in every respect;
- 3. I am the authorized representative of the Tenderer with authority to sign this Certificate, and to submit the Tender on behalf of the Tenderer;
- 4. For the purposes of this Certificate and the Tender, I understand that the word "competitor" shall include any individual or organization, other than the Tenderer, whether or not affiliated with the Tenderer, who:
  - a) Has been requested to submit a Tender in response to this request for tenders;
  - b) could potentially submit a tender in response to this request for tenders, based on their qualifications, abilities or experience;
- 5. The Tenderer discloses that [check one of the following, as applicable]:
  - a) The Tenderer has arrived at the Tender independently from, and without consultation, communication, agreement or arrangement with, any competitor;
  - b) The Tenderer has entered into consultations, communications, agreements or arrangements with one or more competitors regarding this request for tenders, and the Tenderer discloses, in the attached document(s), complete details thereof, including the names of the competitors and the nature of, and reasons for, such consultations, communications, agreements or arrangements;
- 6. In particular, without limiting the generality of paragraphs (5) (a) or (5) (b) above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
  - a) prices;
  - b) methods, factors or formulas used to calculate prices;
  - c) the intention or decision to submit, or not to submit, a tender; or
  - d) the submission of a tender which does not meet the specifications of the request for Tenders; except as specifically disclosed pursuant to paragraph (5) (b) above;
- 7. In addition, there has been no consultation, communication, agreement or arrangement with any competitor regarding the quality, quantity, specifications or delivery particulars of the works or services to which this request for tenders relates, except as specifically authorized by the procuring authority or as specifically disclosed pursuant to paragraph (5) (b) above;
- 8. the terms of the Tender have not been, and will not be, knowingly disclosed by the Tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender opening, or of the awarding of the Contract, whichever comes first, unless otherwise required by law or as specifically disclosed pursuant to paragraph (5) (b) above.

Name\_Title\_\_Date \_\_

# [Name, title and signature of authorized agent of Tenderer and Date]

# (iii) SELF-DECLARATION FORMS

# FORM SD 1

# SELF DECLARATION THAT THE PERSON/TENDERER IS NOT DEBARRED IN THE MATTER OF THE PUBLIC PROCUREMENT AND ASSET DISPOSAL ACT 2015.

I, ...... of Post Office Box......being a resident of.......do hereby make a statement as follows: -

- 2. THAT the aforesaid Bidder, its Directors and subcontractors have not been debarred from participating in procurement proceeding under Part IV of the Act.
- 3. THAT what is deponed to herein above is true to the best of my knowledge, information and belief.

(Title)	(Signature)	(Date)

Bidder Official Stamp

# FORM SD2

# SELF DECLARATION THAT THE PERSON/TENDERER WILL NOT ENGAGE IN ANY CORRUPT OR FRAUDULENT PRACTICE.

- 2. THAT the aforesaid Bidder, its servants and/or agents /subcontractors will not engage in any corrupt or fraudulent practice and has not been requested to pay any inducement to any member of the Board, Management, Staff and/or employees and/or agents of ...... (*insert name of the Procuring entity*) which is the procuring entity.
- 4. THAT the aforesaid Bidder will not engage /has not engaged in any corrosive practice with other bidders participating in the subject tender
- 5. THAT what is deponed to herein above is true to the best of my knowledge information and belief.

**Bidder's Official Stamp** 

# DECLARATION AND COMMITMENT TO THE CODE OF ETHICS

I.....declare that I have read and fully understood the contents of the Business/Company/Firm) .....declare that I have read and fully understood the contents of the Public Procurement & Asset Disposal Act, 2015, Regulations and the Code of Ethics for persons participating in Public Procurement and Asset Disposal and my responsibilities under the Code.

I do hereby commit to abide by the provisions of the Code of Ethics for persons participating in Public Procurement and Asset Disposal.

Name of Authorized signatory
Sign
Position
Office address
Telephone E-
mail
Name of the Firm/Company
Date
(Company Seal/ Rubber Stamp where applicable)
Witness
Name
Sign
Date
#### iv) APPENDIX 1-FRAUD AND CORRUPTION

(Appendix 1 shall not be modified)

#### 1. Purpose

The Government of Kenya's Anti-Corruption and Economic Crime laws and their sanction's policies and procedures, Public Procurement and Asset Disposal Act (*no. 33 of 2015*) and its Regulation, and any other Kenya's Acts or Regulations related to Fraud and Corruption, and similar offences, shall apply with respect to Public Procurement Processes and Contracts that are governed by the laws of Kenya.

#### 2. Requirements

- The Government of Kenya requires that all parties including Procuring Entities, Tenderers, (applicants/proposers), Consultants, Contractors and Suppliers; any Sub-contractors, Sub-consultants, Service providers or Suppliers; any Agents (whether declared or not); and any of their Personnel, involved and engaged in procurement under Kenya's Laws and Regulation, observe the highest standard of ethics during the procurement process, selection and contract execution of all contracts, and refrain from Fraud and Corruption and fully comply with Kenya's laws and Regulations as per paragraphs 1.1 above.
- Kenya's public procurement and asset disposal act (*no. 33 of 2015*) under Section 66 describes rules to be followed and actions to be taken in dealing with Corrupt, Coercive, Obstructive, Collusive or Fraudulent practices, and Conflicts of Interest in procurement including consequences for offences committed. A few of the provisions noted below highlight Kenya's policy of no tolerance for such practices and behavior:
  - 1) A person to whom this Act applies shall not be involved in any corrupt, coercive, obstructive, collusive or fraudulent practice; or conflicts of interest in any procurement or asset disposal proceeding;
  - 2) A person referred to under subsection (1) who contravenes the provisions of that sub-section commits an offence;
  - 3) Without limiting the generality of the subsection (1) and (2), the person shall be:
    - a) disqualified from entering into a contract for a procurement or asset disposal proceeding; or
    - b) if a contract has already been entered into with the person, the contract shall be voidable;
  - 4) The voiding of a contract by the procuring entity under subsection (7) does not limit any legal remedy the procuring entity may have;
  - 5) An employee or agent of the procuring entity or a member of the Board or committee of the procuring entity who has a conflict of interest with respect to a procurement:
    - a) Shall not take part in the procurement proceedings;
    - b) Shall not, after a procurement contract has been entered into, take part in any decision relating to the procurement or contract; and
    - c) shall not be a subcontractor for the tenderer to whom was awarded contract, or a member of the group of tenderers to whom the contract was awarded, but the subcontract or appointed shall meet all the requirements of this Act.
  - 6) An employee, agent or member described in subsection (1) who refrains from doing anything prohibited under that subsection, but for that subsection, would have been within his or her duties shall disclose the conflict of interest to the procuring entity;
  - 7) If a person contravenes subsection (1) with respect to a conflict of interest described in subsection (5) (a) and the contract is awarded to the person or his relative or to another person in whom one of them had a direct or indirect pecuniary interest, the contract shall be terminated and all costs incurred by the public entity shall be made good by the awarding officer. Etc.

In compliance with Kenya's laws, regulations and policies mentioned above, the Procuring Entity:

- a) Defines broadly, for the purposes of the above provisions, the terms set forth below as follows:
  - i) "corrupt practice" is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
  - ii) "fraudulent practice" is any act or omission, including misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
  - iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
  - iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
  - v) "obstructive practice" is:
    - deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede investigation by Public Procurement Regulatory Authority (PPRA) or any other appropriate authority appointed by Government of Kenya into allegations of a corrupt, fraudulent, coercive, or collusive practice; and/or threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
    - acts intended to materially impede the exercise of the PPRA's or the appointed authority's inspection and audit rights provided for under paragraph 2.3 e. below.
- (b) Defines more specifically, in accordance with the above procurement Act provisions set forth for fraudulent and collusive practices as follows:

"fraudulent practice" includes a misrepresentation of fact in order to influence a procurement or disposal process or the exercise of a contract to the detriment of the procuring entity or the tenderer or the contractor, and includes collusive practices amongst tenderers prior to or after tender submission designed to establish tender prices at artificial non-competitive levels and to deprive the procuring entity of the benefits of free and open competition.

- c) Rejects a proposal for award<sup>1</sup> of a contract if PPRA determines that the firm or individual recommended for award, any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/ or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- d) Pursuant to the Kenya's above stated Acts and Regulations, may sanction or debar or recommend to appropriate authority(ies) for sanctioning and debarment of a firm or individual, as applicable under the Acts and Regulations;
- e) Requires that a clause be included in Tender documents and Request for Proposal documents requiring (i) Tenderers (applicants/proposers), Consultants, Contractors, and Suppliers, and their Sub-contractors, Sub-consultants, Service providers, Suppliers, Agents personnel, permit the PPRA or any other appropriate authority appointed by Government of Kenya to inspect<sup>2</sup> all accounts, records and other documents relating to the procurement process, selection and/or contract execution, and to have them audited by auditors appointed by the PPRA or any other appropriate authority appointed by Government of Kenya; and
- f) Pursuant to Section 62 of the above Act, requires Applicants/Tenderers to submit along with their Applications/Tenders/Proposals a "Self-Declaration Form" as included in the procurement document declaring that they and all parties involved in the procurement process and contract execution have not engaged/will not engage in any corrupt or fraudulent practices.

## 2. TENDERER INFORMATION FORM

[The Tenderer shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: [insert date (as day, month and year) of Tender submission].

ITT No.: *[insert number of Tendering process]* 

Alternative No.: \_\_\_\_\_ [insert identification No if this is a Tender for an alternative]

1. Tenderer's Name [insert Tenderer's legal name]

2. In case of JV, legal name of each member: [insert legal name of each member in JV]

3. Tenderer's actual or intended country of registration: [insert actual or intended country of registration]

4. Tenderer's year of registration: *[insert Tenderer's year of registration]* 

5. Tenderer's Address in country of registration: [insert Tenderer's legal address in country of registration]

6. Tenderer's Authorized Representative Information Name: [insert Authorized Representative's name] Address: [insert Authorized Representative's Address] Telephone: [insert Authorized Representative's telephone/fax numbers] Email Address: [insert Authorized Representative's email address]

7. Attached are copies of original documents of [check the box(es) of the attached original documents]

Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITT 4.4.

In case of JV, Form of intent to form JV or JV agreement, in accordance with ITT 4.1.

Acurrent tax clearance certificate or tax exemption certificate in case of Kenyan tenderers issued by the the Kenya Revenue Authority in accordance with ITT 4.14.

- In case of state-owned enterprise or institution, in accordance with ITT 4.6 documents establishing:
- Legal and financial autonomy
- Operation under commercial law
- Establishing that the Tenderer is not under the supervision of the agency of the Procuring Entity

8.Included are the organizational chart and a list of Board of Directors.

## FORM CON -2

Historical Contract Non-Performance, Pending Litigation and Litigation History

Tenderer's Name:	Date:	JV	Member's
Name	ITT No. and	title:	

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria

Contract non-performance did not occur since 1<sup>st</sup> January *[insert year]* specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1.

 $\Box$  Contract(s) not performed since 1<sup>st</sup> January *[insert year]* specified in Section III, Evaluation and Qualification Criteria, requirement 2.1

Year	Non- performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and Kenya Shilling equivalent)
[insert year]	[insert amount and percentage]	Contract Identification: [indicate complete contract name/ number, and any other identification]	[insert amount]
		Name of Procuring Entity: [insert full name]	
		Address of Procuring Entity: [insert street/city/country]	
		Reason(s) for nonperformance: [indicate main reason(s)]	

Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria

□ No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.

Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.

Year of	Amount in	Contract Identification	Total Contract Amount
dispute	dispute		(currency), Kenya Shilling
	(currency)		Equivalent (exchange
			rate)
		Contract Identification:	
		Name of Procuring Entity:	
		Address of Procuring Entity:	
		Matter in dispute:	
		Party who initiated the dispute:	
		Status of dispute:	
		Contract Identification:	
		Name of Procuring Entity:	
		Address of Procuring Entity:	
		Matter in dispute:	
		Party who initiated the dispute:	
		Status of dispute:	
Litigation H	listory in accord	lance with Section III, Evaluation and Qualific	ation Criteria
□ No	Litigation Histo	bry in accordance with Section III, Evaluation an	nd Qualification Criteria,
Sub-Factor 2	2.4.	-	-
🗆 Liti	gation History	in accordance with Section III, Evaluation and Q	ualification Criteria, Sub-
Factor 2.4 as	s indicated below	V.	-

## **OTHER FORMS**

## 3. TENDERER'S JV MEMBERS INFORMATION FORM

[The Tenderer shall fill in this Form in accordance with the instructions indicated below. The following table shall be filled in for the Tenderer and for each member of a Joint Venture]].

Date...... [insert date (as day, month and year) of Tender submission]

1. Tenderer's Name: [insert Tenderer's legal name]

2. Tenderer's JV Member's name: [insert JV's Member legal name]

3. Tenderer's JV Member's country of registration: [insert JV's Member country of registration]

4. Tenderer's JV Member's year of registration: [insert JV's Member year of registration]

- 5. Tenderer's JV Member's legal address in country of registration: [insert JV's Member legal address in country of registration]
- 6. Tenderer's JV Member's authorized representative information

Name: [insert name of JV's Member authorized representative]

Address: [insert address of JV's Member authorized representative]

Telephone/Fax numbers: [insert telephone/fax numbers of JV's Member authorized representative]

Email Address: [insert email address of JV's Member authorized representative]

- 7. Attached are copies of original documents of [check the box(es) of the attached original documents]
- □ Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITT 4.4.
- □ In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Procuring Entity, in accordance with ITT 4.6.

8.Included are the organizational chart and a list of Board of Directors.

#### FORM OF TENDER SECURITY-[Option 1–Demand Bank Guarantee]

- 1. We have been informed that \_\_\_\_\_(here inafter called "the Applicant") has submitted or will submit to the Beneficiary its Tender (here inafter called" the Tender") for the execution of \_\_\_\_\_ under Request for Tenders No.\_\_\_\_("the ITT").
- 2. Furthermore, we understand that, according to the Beneficiary's conditions, Tenders must be supported by a Tender guarantee.
- 3. At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of \_\_\_\_\_\_\_) upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:
- (a) has withdrawn its Tender during the period of Tender validity set forth in the Applicant's Letter of Tender ("the Tender Validity Period"), or any extension thereto provided by the Applicant; or
- b) having been notified of the acceptance of its Tender by the Beneficiary during the Tender Validity Period or any extension there to provided by the Applicant, (i) has failed to execute the framework agreement, or (ii) has failed to furnish the Performance.
- 4. This guarantee will expire: (a) if the Applicant is the successful Tenderer, upon our receipt of copies of the framework agreement signed by the Applicant and the Performance Security and, or (b) if the Applicant is not the successful Tenderer, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Tendering process; or (ii) thirty days after the end of the Tender Validity Period.
- 5. Consequently, any demand for payment under this guarantee must be received by us at the office indicated above onor before that date.

[signature(s)]

#### FORMAT OF TENDER SECURITY [Option 2–Insurance Guarantee]

#### TENDER GUARANTEE No.:

Sealed with the Common Seal of the said Guarantor this \_\_\_\_day of \_\_\_\_\_ 20 \_\_\_.

- 3. NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Applicant:
  - a) has withdrawn its Tender during the period of Tender validity set forth in the Principal's Letter of Tender ("the Tender Validity Period"), or any extension thereto provided by the Principal; or
  - b) having been notified of the acceptance of its Tender by the Procuring Entity during the Tender Validity Period or any extension thereto provided by the Principal; (i) failed to execute the Contract agreement; or (ii) has failed to furnish the Performance Security, in accordance with the Instructions to tenderers ("ITT") of the Procuring Entity's Tendering document.

then the guarantee undertakes to immediately pay to the Procuring Entity up to the above amount upon receipt of the Procuring Entity's first written demand, without the Procuring Entity having to substantiate its demand, provided that in its demand the Procuring Entity shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

- 4. This guarantee will expire: (a) if the Applicant is the successful Tenderer, upon our receipt of copies of the contract agreement signed by the Applicant and the Performance Security and, or (b) if the Applicant is not the successful Tenderer, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the Tendering process; or (ii)twenty-eight days after the end of the Tender Validity Period.
- 5. Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

[Date ]

[Signature of the Guarantor]

[Witness]

[Seal]

## FORM OF TENDER - SECURING DECLARATION

[The Tenderer shall fill in this Form in accordance with the instructions indicated.]

Date:		[date	(as	day,	month	and
year)] ITT	No.:		.[number	of	Ten	dering
process] Alterna	tive No.:	[ins	sert identi	ification N	o if this	is a Tender for an
alternative] To:.		[	complete	nar	ne	of
Procuring	Entity] We,	the		undersi	gned,	

declare that: We understand that, according to your conditions, Tenders must be

supported by a Tender-Securing Declaration.

We accept that we will automatically be suspended from being eligible for Tendering or submitting proposals in any contract with the Procuring Entity for the period of time of *[number of months or years]* starting on *[date]*, if we are in breach of our obligation(s) under the Tender conditions, because we:

- a) Have withdrawn our Tender during the period of Tender validity specified in the Form of Tender; or
- b) Having been notified of the acceptance of our Tender by the Procuring Entity during the period of Tender validity, (i) fail to sign the Framework agreement; or (ii) fail or refuse to furnish the Performance Security, if required, in accordance with the ITT.

We understand this Tender Securing Declaration shall expire if we are not the successful Tenderer, upon the earlier of (i) our receipt of your notification to us of the name of the successful Tenderer; or (ii) twenty-eight days after the expiration of our Tender.

Name of the Tenderer\*\_\_\_\_\_Name of the person duly authorized to sign the Tender on behalf of

the Tenderer\*\*\_\_\_\_\_\_Title of the person signing the Tender\_\_\_\_\_\_Signature of the

person named above\_\_\_\_\_ Date signed\_\_\_day of\_,\_\_\_\_

\*: In the case of the Tender submitted by joint venture specify the name of the Joint Venture as Tenderer

\*\*: Person signing the Tender shall have the power of attorney given by the Tenderer attached to the Tender

[Note: In case of a Joint Venture, the Tender-Securing Declaration must be in the name of all members to the Joint Venture that submits the Tender.]

## **QUALIFICATION FORMS**

## 2 FOREIGN TENDERERS 40% RULE

Pursuant to ITT 3.9, a foreign tenderer must complete this form to demonstrate that the tender fulfils this condition.

ITEM	Description of Work Item	Describe location of	COST in	Comments, if any
		Source	K. shillings	
А	Local Labor			
1				
2				
3				
4				
5				
В	Sub contracts from Local source	s		
1				
2				
3				
4				
5				
С	Local materials			
1				
2				
3				
4				
5				
D	Use of Local Plant and Equipme	nt		
1				
2				
3				
4				
5				
Е	Add any other items			
1				
2				
3				
4				
5				
6				
	TOTAL COST LOCAL CONTR	ENT	XXXXX	
	PERCENTAGE OF CONTRAC	T PRICE		

## **3.** FORM EQU: EQUIPMENT

The Tenderer shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Tenderer.

·				
Item of equipm	ent			
Equipment information	Name of manufac	turer		Model and power rating
	Capacity			Year of manufacture
Current status	Current location			
	Details of current	commitments		
Source	Indicate source of	the equipment	t	
	□ Owned	□ Rented	□ Leased	□ Specially manufactured

Omit the following information for equipment owned by the Tenderer.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

## 4. <u>FORM PER-1</u> Tenderer's/Contractor's

#### **Representative and Key Personnel Schedule**

Tenderers should provide the names and details of the suitably qualified Contractor's Representative and Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

## Tenderer's/Contractor' Representative and Key Personnel.

1.	Title of position: Contractor's Representative		
	Name of candidate:		
	Duration of	[insert the whole period (start and end dates) for which this position will be	
	appointment:	engaged]	
	Time commitment: for	[insert the number of days/week/months/ that has been scheduled for this	
	this position:	position]	
	Expected time schedule	[insert the expected time schedule for this position (e.g. attach high level	
	for this position:	Gantt chart]	
2.	Title of position: [	]	
	Name of candidate:		
	Duration of	[insert the whole period (start and end dates) for which this position will be	
	appointment:	engaged]	
	Time commitment: for	[insert the number of days/week/months/ that has been scheduled for this	
	this position:	position]	
	Expected time schedule	[insert the expected time schedule for this position (e.g. attach high level	
	for this position:	Gantt chart]	
3.	Title of position: [	]	
	Name of candidate:		
	Duration of	[insert the whole period (start and end dates) for which this position will be	
	appointment:	engaged]	
	Time commitment: for	[insert the number of days/week/months/ that has been scheduled for this	
	this position:	position]	
	Expected time schedule	[insert the expected time schedule for this position (e.g. attach high level	
	for this position:	Gantt chart]	
4.	Title of position: []		
	Name of candidate:		
	Duration of	[insert the whole period (start and end dates) for which this position will be	
	appointment:	engaged]	
	Time commitment: for	[insert the number of days/week/months/ that has been scheduled for this	
	this position:	position]	
	Expected time schedule	[insert the expected time schedule for this position (e.g. attach high level	
	for this position:	Gantt chart]	
5.	Title of position: [insert titl	e]	
	Name of candidate		
	Duration of	[insert the whole period (start and end dates) for which this position will be	
	appointment:	engaged]	
	Time commitment: for	[insert the number of days/week/months/ that has been scheduled for this	
	this position:	position]	
	Expected time schedule	[insert the expected time schedule for this position (e.g. attach high level	
	for this position:	Gantt chart]	

## 5. **FORM PER - 2:**

Resume and Declaration - Contractor's Representative and Key Personnel. Name of Tenderer\_\_\_\_\_

Position [#1]:	[title of position from Form PER-1]		
Personnel information	Name:	Date of birth:	
	Address:	E-mail:	
	Professional qualifications:		
	Academic qualifications: Academic qualifications: Language proficiency: [language of Language proficiency: [la	and levels of speaking, reading and writing skills] anguage and levels of speaking, reading and writing sk	killsj
Details	Address of Procuring Entity:		
	Telephone:	Contact (manager / personnel officer):	
	Fax:		
	Job title:	Years with present Procuring Entity:	

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

Project	Role	Duration of involvement	Relevant experience
[main project details]	[role and responsibilities on the project]	[time in role]	[describe the experience relevant to this position]

## Declaration

I, the undersigned...... *[insert either "Contractor's Representative" or "Key Personnel" as applicable]*, certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Tender:

Commitment	Details
Commitment to duration of contract:	[insert period (start and end dates) for which this
	Contractor's Representative or Key Personnel is available
	to work on this contract]
Time commitment:	[insert period (start and end dates) for which this
	Contractor's Representative or Key Personnel is available
	to work on this contract]

I understand that any misrepresentation or omission in this Form may:

- a) be taken into consideration during Tender evaluation;
- b) result in my disqualification from participating in the Tender;
- c) result in my dismissal from the contract.

Name of Contractor's Representative or Key Personnel: [insert

name] Signature:\_\_\_\_\_

Date: (day month year):

Countersignature of authorized representative of the Tenderer:

Signature:\_\_\_\_\_ Date: (day month year): \_\_\_\_\_

#### TENDERERS QUALIFICATION WITHOUT PREQUALIFICATION

To establish its qualifications to perform the contract in accordance with Section III, Evaluation and Qualification Criteria the Tenderer shall provide the information requested in the corresponding Information Sheets included hereunder.

#### 6. FORM EL I -

#### **1.1 Tenderer**

#### **Information Form**

Date:\_\_\_\_\_

ITT No. and title:

Tenderer's name
In case of Joint Venture (JV), name of each member:
Tenderer's actual or intended country of registration:
[indicate country of Constitution]
Tenderer's actual or intended year of incorporation:
Tenderer's legal address [in country of registration]:
Tenderer's authorized representative information
Name:
Address:
Telephone/Fax numbers:
E-mail address:
1. Attached are copies of original documents of
Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of
registration of the legal entity named above, in accordance with ITT 4.4
In case of JV, letter of intent to form JV or JV agreement, in accordance with ITT 4.1
In case of state-owned enterprise or institution, in accordance with ITT 4.6, documents establishing:
Legal and financial autonomy
Operation under commercial law
• Establishing that the Tenderer is not under the supervision of the Procuring Entity
2. Included are the organizational chart and a list of Board of Directors.

#### 7. **FORM ELI - 1.2**

#### **Tenderer's JV Information Form**

(to be completed for each member of Tenderer's JV)

Date:\_\_\_\_\_ ITT No. and title:\_\_\_\_

Tenderer's JV name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information
Name:
Address:
Telephone/Fax numbers:
E-mail address:
<ol> <li>Attached are copies of original documents of</li> <li>Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITT 4.4.</li> <li>In case of a state-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Procuring Entity, in accordance with ITT 4.6.</li> </ol>

2. Included are the organizational chart and a list of Board of Directors.

## 8 FORM CON -2

Historical Contract Non-Performance, Pending Litigation and Litigation

History. Tenderer's Name:

Date:\_\_\_\_\_\_ JV Member's Name\_\_\_\_ ITT No. and title:\_\_\_\_\_

Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria
Contract non-performance did not occur since 1<sup>st</sup> January *[insert year]* specified in Section III,
Evaluation and Qualification Criteria, Sub-Factor 2.1.

Contract(s) not performed since 1<sup>st</sup> January *[insert year]* specified in Section III, Evaluation and Qualification Criteria, requirement 2.1

Year	Non- performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and Kenya Shilling equivalent)
[insert year]	[insert amount and percentage]	Contract Identification: [indicate complete contract name/ number, and any other identification] Name of Procuring Entity: [insert full name]	[insert amount]
		Address of Procuring Entity: <i>[insert street/city/country]</i> Reason(s) for nonperformance: <i>[indicate main reason(s)]</i>	
Pending 1	Litigation, in accorda	nce with Section III, Evaluation and Qualification Criteria	
	No pending litigation	in accordance with Section III, Evaluation and Qualificatio	on Criteria, Sub-
Factor 2.	3.		
	Pending litigation in a	accordance with Section III, Evaluation and Qualification Crit	eria, Sub-Factor 2.3

as indicated below.

Year of	Amount in	Cont	ract Identification	Total Contract Amount
dispute	dispute			(currency), Kenya Shilling
	(currency)			Equivalent (exchange rate)
Cont		Cont	ract Identification:	
		Nam	e of Procuring Entity:	
		Addr	ess of Procuring Entity:	
		Matt	er in dispute:	
		Party	who initiated the dispute:	
		Statu	s of dispute:	
	Cont		ract Identification:	
		Nam	e of Procuring Entity:	
Add		Addr	ess of Procuring Entity:	
Matt		Matt	er in dispute:	
Party		Party	who initiated the dispute:	
		Statu	s of dispute:	
Litigatio	n History in ac	corda	nce with Section III, Evaluation and Qua	lification Criteria
1	No Litigation I	History	in accordance with Section III, Evaluation	on and Qualification Criteria, Sub-
Factor 2.4	4.			-
	Litigation Hist	ory in	accordance with Section III, Evaluation a	nd Qualification Criteria, Sub-
Factor 2.4 as indicated below.				-
Year of Outcome as		e as	Contract Identification	Total Contract Amount
award percentage		age		(currency), Kenya Shilling
	of Net	3		Equivalent (exchange rate)
	Worth			

Year of	Am	ount in	Cont	ract Identification	Total Contract Amount
dispute	disp	dispute			(currency), Kenya Shilling
	(cur	rency)		r	Equivalent (exchange rate)
[insert		[insert		Contract Identification: [indicate	[insert amount]
year]		percenta	ge]	complete contract name, number,	
				and any other identification]	
				Name of Procuring Entity: [insert	
				full name]	
				Address of Procuring Entity: [insert	
				street/city/country]	
				Matter in dispute: [indicate main	
				issues in dispute]	
				Party who initiated the dispute:	
				[indicate "Procuring Entity" or	
				"Contractor"]	
				Reason(s) for Litigation and award	
				decision [indicate main reason(s)]	

## 9. FORM FIN -3.1:

## **Financial Situation and Performance**

Tenderer's Name: \_\_\_\_\_ Date: \_\_\_\_\_ JV Member's Name \_\_\_\_\_ ITT No. and title: \_\_\_\_\_

Type of Financial information         Historic information for previous								
(currency)	(amount in currency, currency, exchange rate*, USD equivalent)							
	Year 1	Year 2	Year 3	Year 4	Year 5			
Statement of Financial Position (	Information	from Balance	Sheet)					
Total Assets (TA)								
Total Liabilities (TL)								
Total Equity/Net Worth (NW)								
Current Assets (CA)								
Current Liabilities (CL)								
Working Capital (WC)								
Information from Income Statem	lent							
Total Revenue (TR)								
Profits Before Taxes (PBT)								
Cash Flow Information								
Cash Flow from Operating Activities								

\*Refer to ITT 15 for the exchange rate

## 15. Sources of Finance

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (Kenya Shilling equivalent)
1		
2		
3		

#### **Financial documents**

The Tenderer and its parties shall provide copies of financial statements for \_\_\_\_\_\_years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.1. The financial statements shall:

- a) reflect the financial situation of the Tenderer or in case of JV member, and not an affiliated entity (such as parent company or group member).
- b) Be independently audited or certified in accordance with local legislation.
- c) Be complete, including all notes to the financial statements.
- d) Correspond to accounting periods already completed and audited.

Attached are copies of financial statements<sup>2</sup> for the \_\_\_\_\_\_years required above; and complying with the requirements

<sup>&</sup>lt;sup>2</sup>If the most recent set of financial statements is for a period earlier than 12 months from the date of Tender, the reason for this should be justified.

## 10. FORM FIN -3.2:

#### **Average Annual Construction Turnover**

Tenderer's Name:\_\_\_\_\_ Date:\_\_\_\_\_ JV Member's Name\_\_\_\_\_ ITT No. and title:\_\_\_\_\_

	Annual turnover data (construction only)							
Year	Amount	Exchange rate	Kenya Shilling equivalent					
	Currency							
[indicate year]	[insert amount and indicate							
	currency]							
Average								
Annual								
Construction								
Turnover *								

\* See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.

## 11. FORM FIN -3.3:

#### **Financial Resources**

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contractor contracts as specified in Section III, Evaluation and Qualification Criteria.

Fina	Financial Resources						
No.	Source of financing	Amount (Kenya Shilling equivalent)					
1							
2							
3							

## 12. FORM FIN -3.4:

#### **Current Contract Commitments / Works in Progress**

Tenderers and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

No.	Name of Contract	Procuring Entity's Contact Address, Tel,	Value of Outstanding Work [Current Kenya Shilling /month Equivalent]	Estimated Completion Date	Average Monthly Invoicing Over Last Six Months [Kenya Shilling /month)]
1					
2					
3					
4					
5					

## **13.** FORM EXP - 4.1

## **General Relevant Work Experience**

Tenderer's Name:\_\_\_\_\_ Date:\_\_\_\_\_ JV

Member's Name\_\_\_\_\_ ITT No. and title:\_\_\_\_\_

\_\_\_\_\_Page\_\_of\_\_\_\_pages

Starting	Ending	Contract Identification	Role of
	Year		Tenderer
Year			
		~	
		Contract name:	
		Brief Description of the Works performed by the	
		Tenderer:	
		Amount of contract:	
		Name of Procuring Entity:	
		Address:	
		Contract name:	
		Brief Description of the Works performed by the	
		Tenderer:	
		Amount of contract:	
		Name of Procuring Entity:	
		Address:	
		Contract name:	
		Brief Description of the Works performed by the	
		Tenderer:	
		Amount of contract:	
		Name of Procuring Entity:	
		Address:	

## 14. FORM EXP - 4.2 (a)

## Specific Work and Management Experience

Tenderer's Name: \_\_\_\_\_ Date: \_\_\_\_\_ JV Member's Name \_\_\_\_\_ ITT No. and title: \_\_\_\_\_

Similar Contract No.	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor 🗆	Member in JV	Management Contractor	Sub- contractor
Total Contract Amount	-		Kenya Shilling	
If member in a JV or sub-contractor,				
specify participation in total Contract				
amount				
Procuring Entity's Name:				
Address:				
Telephone/fax number				
E-mail:				
Description of the similarity in				
accordance with Sub-Factor 4.2(a) of				
Section III:				
1. Amount				
2. Physical size of required works				
items				
3. Complexity				
4. Methods/Technology				
5. Construction rate for key				
activities				
6. Other Characteristics				

### 15. FORMEXP- 4.2 (b)

#### Work Experience in Key Activities

Tenderer's Name: \_\_\_\_ Date: \_\_\_\_ Tenderer's JV Member Name: \_\_ Sub-contractor's Name<sup>3</sup>(as per ITT 34):\_\_\_

ITT No. and title:

All Sub-contractors for key activities must complete the information in this form as per ITT 34 and Section III, Evaluation and Qualification Criteria, Sub-Factor 4.2.

#### **1.** Key Activity No One:

	Information				
Contract Identification					
Award date					
Completion date					
Role in Contract	Prime	Mem	ber in	Management	Sub-contractor
	Contractor	JV		Contractor	
Total Contract Amount				Kenya Shilling	5
Quantity (Volume, number or rate of	Total quantity	in 1	Percentage	1	Actual
production, as applicable) performed under	r the contract		participatio	n	Quantity
the contract per year or part of the year	(i) (ii)		(ii)		Performed
					(i) x (ii)
Year 1			_		
Year 2					
Year 3					
Year 4					
Procuring Entity's Name:					
Address:					
Telephone/fax number					
E-mail:					

2 Activity No. Two

3. ....

<sup>3</sup>If applicable

## **SCHEDULE FORMS**

[The Tenderer shall fill in these Forms in accordance with the instructions indicated. The list of line items in column1 of the Activity Schedules shall coincide with the List of Maintenance services specified in the Procuring Entity's Requirements.]

## WORK SCHEDULES AND SPECIFICATIONS

## The Specifications and Priced Activity Schedules

Date: \_\_\_\_\_

ITT No: \_\_\_\_\_

Supp	ly/Service, Installation,	Testin	g and Commissioning of Items	Listed below ar	nd as per Re	quired Schedule
NO.	EQUIPMENT		ITEMS (Supply/service, install & commission)	REQUIRED SCHEDULE	UNITS	UNIT COST (V.A.T inclusive)
1.	Thika River Intake Pump House-Raw	1.1	General inspection	Annual/On request	Sum-per inspection	
	water pumping systems No. 1,2 &	1.2	Pump 1 & 3 Bearings (2 × 33211)	On need basis/On	Nr	
	5. Duty 215 m3/hr. @ 10 m	1.2.1	Pump 2 Bearings (2 × 6307 ZZ/C3)	request		
	Model·1 & 3· Weir	1.3	Stainless steel shaft		Nr	
	2: KSB Etarnorm	1.4	Bronze shaft sleeve		Nr	
	150-125-250 GG 1A PO.	1.5	10 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		Nr.	
	All complete with	1.6	Flex spacer Coupling F 70		Nr	
	15 kW motors	1.7	Coupling rubber/tyre F 70		Nr	
		1.8	Coupling guard		Nr	
		1.9	Impeller		Nr	
		1.10	Casing wear rings		Nr	
		1.11	Laser Alignment		Nr	
		1.12	Resleeving of pump housing/shaft/bearing covers/casing		Sum	
		1.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings	Annual	M <sup>2</sup>	
		1.14	Gland cover complete with stud bolts and nuts in stainless steel.	On need basis	Nr	
2.	Old Pump House - Treated water pumps	2.1	General inspection	Annual/On request	Sum-per inspection	
	No. 1 (312.5m3/hr @57m, 1460 Rpm	2.2	Pump Bearings (2 × 6307 ZZ/C3)	On need	Nr	
	Simpson I td	2.3	Stainless steel shaft	basis/On	Nr	
	Newark on Trent	2.4	Bronze shaft sleeves DE & NDE	request	Nr	
	with 30 kW motor	2.5	10 Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		2.6	Flex Coupling Jaw Type HRC 130		Nr	
		2.7	Coupling rubber insert HRC 130		Nr	
		2.8	Coupling guard		Nr	
		2.9	Impeller		Nr	
		2.10	Casing wear rings	1	Nr	
		2.11	Laser Alignment	1	Nr	
		2.12	Resleeving of pump housing/shaft/bearing	1	Sum	

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NO.	EQUIPMENT		ITEMS (Supply/service, install & commission)	REQUIRED SCHEDULE	UNITS	UNIT COST (V.A.T inclusive)
			covers/casing.			
		2.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
3.	Old Pump House - Treated water pumps	3.1	General inspection	Annual/On request	Sum-per inspection	
	No. 2 (312.5m3/hr @57m, 1460 Rpm	3.2	Pump Bearings (6407 ZZ C3 & 6309 ZZ C3)	On need basis	Nr	
	Model Worthington	3.3	Stainless steel shaft		Nr	
	Newark on Trent	3.4	Bronze shaft sleeves DE & NDE		Nr	
	with 90 kW motor	3.5	10 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		3.6	Flex Coupling F 110		Nr	
		3.7	Coupling rubber/tyre F 110		Nr	
		3.8	Coupling guard		Nr	
		3.9	Impeller		Nr	
		3.10	Casing wear rings		Nr	
		3.11	Laser Alignment		Nr	
		3.12	Resleeving of pump housing/shaft/bearing covers/casing.		Sum	
		3.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	$M^2$	
		3.14	Gland cover complete with studs bolts and nuts in stainless steel.	On need basis	Nr	
4. Old Pu Treated	Old Pump House - Treated water pumps	4.1	General inspection	Annual/On request	Sum-per inspection	
	No. 3 (312.5 m3/hr @57m, 1460 Rpm	4.2	Pump Bearings	On need basis/on request	Nr	
	Model Worthington	4.3	Stainless steel shaft	1	Nr	
	Newark on Trent	4.4	Bronze shaft sleeves DE & NDE		Nr	
	with 110 kW motor	4.5	10 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		4.6	Flex Coupling F120		Nr	
		4.7	Coupling rubber/tyre F 120		Nr	
		4.8	Coupling guard		Nr	
		4.9	Impeller		Nr	
		4.10	Casing wear rings		Nr	
		4.11	Laser Alignment		Nr	
		4.12	Resleeving of pump housing/shaft/bearing covers/casing.		Sum	
		4.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
		4.14	Gland cover complete with studs bolts and nuts in stainless	On need basis	Nr	

NO.	EQUIPMENT		ITEMS (Supply/service, install & commission)	REQUIRED SCHEDULE	UNITS	UNIT COST (V.A.T inclusive)
			steel.			
5.	Main Pump House Treated Water	5.1	General inspection	Annual/On request	Sum-per inspection	
	pump (Bendor)- KSB Etarnorm 065-	5.2	Pump Bearings (2 × 6310 ZZ C3	On need basis/On	Nr	
	050-315/2P with duty of 90 m3/hr @	5.3	Stainless steel shaft	request	Nr	
	118m.	5.4	Bronze shaft sleeve	-	Nr	
	Complete with 55 kW motor	5.5	12 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		5.6	Flex Coupling F 100		Nr	
		5.7	Coupling rubbers F 100		Nr	
		5.8	Coupling guard		Nr	
		5.9	Impeller	-	Nr	
		5.10	Casing wear ring	-	Nr Nr	
		5.11	Laser Angnment			
		5.12	Resideving of pump housing/shaft/bearing covers/casing		Sum	
		5.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
		5.14	Gland cover complete with studs bolts and nuts in stainless steel.	On need basis	Nr	
6.	Main Pump House Treated water, High	6.1	General inspection	Annual/On request	Sum-per inspection	
	lift pumps No.1,2,3,4 & 5 Weir Pumps LTD Scotland, Unit No: 65804/003, Unit Code: 3DC160/200 complete with 110 kW motors	6.2	Pump Bearings (N308 ECM & 6308 ZZ C3)	On need basis	Nr	
		6.3	Stainless steel shaft		Nr	
		6.4	Bronze shaft sleeves DE & NDE		Nr	
		6.5	12 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		6.6	Flex Coupling F 110		Nr	
		6.7	Coupling rubbers F 110		Nr	
		6.8	Coupling guard		Nr	
		6.9	Impeller		Nr	
		6.10	Casing wear ring		Nr	
		6.11	Laser Alignment	-	Nr	
		6.12	housing/shaft/bearing covers/casing		Sum	
		6.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
		6.14	Gland cover complete with studs bolts and nuts in stainless steel.	On need basis	Nr	

NO.	EQUIPMENT		ITEMS (Supply/service, install & commission)	REQUIRED SCHEDULE	UNITS	UNIT COST (V.A.T inclusive)
7.	Ngoingwa Booster Pump Station-	7.1	General inspection	Annual/On request	Sum-per inspection	
	Treated water pumps No. 1 & 2	7.2	Pump Bearings (NU210K + H210 & 3309 A C3)	On need basis/On	Nr	
	(Head of 110m), model KSB numn	7.3	Stainless steel shaft	request	Nr	
	wkl 100/5 complete with 55kw drive	7.4	Bronze shaft sleeves DE & NDE		Nr	
	motors.	7.5	10 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		7.6	Flex Coupling F80		Nr	
		7.7	Coupling rubbers F 80		Nr	
		7.8	Coupling guard		Nr	
		7.9	Impeller	-	Nr	
		7.10	Casing wear ring		Nr	
		7.11	Laser Alignment		Nr	
		7.12	Resleeving of pump housing/shaft/bearing covers/casing		Sum	
		7.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
		7.14	Gland cover complete with studs bolts and nuts in stainless steel.	On need basis	Nr	
8.	Gatundu Booster station pump- Treated water pump - Pumpenfabrik make complete with 11 kW	8.1	General inspection	Annual/On request	Sum-per inspection	
		8.2	Pump Bearings	On need basis/On	Nr	
		8.3	Stainless steel shaft		Nr	
	motor.	8.4	Bronze shaft sleeve	request	Nr	
		8.5	8 mm Graphite impregnated PTFE Gland Packing in 10 meters roll.		М	
		8.6	Flex coupling F 80	-	Nr	
		8.7	Coupling rubbers F 80	_	Nr	
		8.8	Coupling guard	-	Nr	
		8.9	Impeller	-	Nr	
		8.10	Casing wear ring	-	Nr	
		8.11	Laser Alignment		Nr	
		8.12	Resleeving of pump housing/shaft/bearing covers/casing		Sum	
		8.13	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
		8.14	Gland cover complete with studs bolts and nuts in stainless steel.	On need basis	Nr	
9	Old Sewage (Pilot) Plant-Sewer pump-	9.1	General inspection	Annual/On request	Sum-per inspection	
	KSB Sewatec D 150-	9.2	Pump Bearings (2×7315 BEP)	On need basis	Nr	

Supp	ly/Service, Installation, 7	Festin	g and Commissioning of Items	Listed below and	d as per Re	equired Schedule
NO.	EQUIPMENT		ITEMS (Supply/service, install & commission)	REQUIRED SCHEDULE	UNITS	UNIT COST (V.A.T inclusive)
	400 pump with duty of	9.3	Stainless steel shaft		Nr	
	192m3/hr at 40 m.	9.4	Bronze shaft sleeves		Nr	
	motor	9.5	Shaft mechanical seal		М	
		96	Coupling guard		Nr	
	(Vertical orientation)	9.7	Flex coupling - N Eupex 160			
		9.8	Coupling rubber elements-size 160			
		9.9	Impeller		Nr	
		9.10	Casing wear ring		Nr	
		9.11	Resleeving of pump housing/shaft/bearing covers/casing		Sum	
		9.12	Paint protection, Pump, Motor, coupling guards, and associated pipework & fittings.	Annual	M <sup>2</sup>	
11	Electric Motors	9.1	11 kW Electric Induction Motors (3 Phase 415V)			
		(i)	Replacement of bearings (DE	On need basis		
		<i>(</i> '')	& NDE)		Sum	
		(11)	Rewinding Devilopment of terminal		Sum	
		(111)	blocks		Sum	
		(iv)	Motor Starter- Star Delta		Sum	
		(v)	Resleeving of shaft/end covers		Sum	
		9.2	15 kW Electric Induction Motors (3Phase 415V)			
		(i)	Replacement of bearings (DE & NDE)	On need basis	Sum	
		(ii)	Rewinding		Sum	
		(111)	Replacement of terminal blocks		Sum	
		(iv)	Motor Starter- Star Delta		Sum	
		(v)	Resleeving of shaft/end covers		Sum	
		9.3	22 kW Electric Induction Motors (3 Phase 415V)			
		(i)	Replacement of bearings (DE & NDE)	On need basis	Sum	
		(ii)	Rewinding		Sum	
		(iii)	Replacement of terminal blocks		Sum	
		(1V)	Motor Starter- Star Delta		Sum	
		(v)	Resleeving of shaft/end covers		Sum	
		9.4	30 kW Electric Induction Motors (3 Phase 415V)			
		(i)	Replacement of bearings (DE & NDE)	On need basis	Sum	
		(ii)	Rewinding		Sum	
		(111)	Replacement of terminal blocks		Sum	

Supply/Service, Installation, Testing and Commissioning of Items Listed below and as per Required Schedule ITEMS UNIT COST (Supply/service, install & REQUIRED NO. EQUIPMENT UNITS commission) SCHEDULE (V.A.T inclusive) (iv) Motor Starter- Star Delta Sum Resleeving of shaft/end covers (v) Sum 9.5 40 kW Electric Induction Motors (3 phase 415 V) Replacement of bearings (DE On need basis Sum (i) & NDE) (ii) Rewinding Sum (iii) Replacement of terminal Sum blocks Motor Starter- Star Delta (iv) Sum (v) Resleeving of shaft/end covers Sum 9.6 55 kW Electric Induction Motors (3 phase 415 V) (i) Replacement of bearings On need basis Sum (DE & NDE) (ii) Sum Rewinding Replacement of terminal (iii) Sum blocks (iv) Motor Starter- Star Delta Sum Resleeving of shaft/end covers (v) Sum 9.7 90 kW Electric Induction Motors (3 phase 415 V) Replacement of bearings (DE (i) On need basis & NDE) Sum Rewinding (ii) Sum (iii) Replacement of terminal Sum blocks Motor Starter- Star Delta (iv) Sum Resleeving of shaft/end covers (v) On need basis Sum 10.8 110 kW Electric Induction Motors (3 phase 415 V) Replacement of bearings (DE (i) On need basis & NDE) Sum (iii) Rewinding Sum Replacement of terminal (iii) Sum blocks Motor Starter- Star Delta (iv) Sum (v) Resleeving of shaft/end covers Sum **Total Price V.A.T.inclusive** 

Note:

a) All prices quoted must be inclusive of all taxes; Quantities indicated are estimates; actual quantities shall be requested on need basis through a local service order.

b)Lowest evaluated bidder in all items shall be awarded the framework contract for 1 year.

Name of tenderer\_\_\_\_\_

Sign:\_\_\_\_\_

Date:\_\_\_\_\_

## 1. Method Statement

A contractor will be called to inspect and repair the pump in question, and the rates for parts replaced will be the ones listed in the price schedule.

## 4. OTHERS – TIME SCHEDULE – NOT APPLICABLE

## 5. NOTIFICATION OF INTENTION TO AWARD

### [This Notification of Intention to Award shall be sent to each Tenderer that submitted a Tender.] [Send

#### this Notification to the Tenderer's Authorized Representative named in the Tenderer Information Form]

Telephone numbers: ......[insert Authorized Representative's telephone/fax numbers]

Email Address: ......[insert Authorized Representative's email address]

[IMPORTANT: insert the date that this Notification is transmitted to Tenderers. The Notification must be sent to all Tenderers simultaneously. This means on the same date and as close to the same time as possible.]

**DATEOFTRANSMISSION**: This Notification is sent by: [*email/fax*] on [*date*] (local time)

**Procuring Entity:** ......[insert the name of the Procuring Entity]

**Contract title:** ......[insert the name of the contract]

This Notification of Intention to Award (Notification) notifies you of our decision to award the above contract. The transmission of this Notification begins the Standstill Period. During the Standstill Period you may:

a) Request a debriefing in relation to the evaluation of your Tender, and/or

b) Submit a Procurement-related Complaint in relation to the decision to award the contract.

#### (i) The successful Tenderer

No.	Description and No. of Service Line or Package	[insert name of successful Tenderer]	[insert Address of successful Tenderer]	Tender price	Evaluated Tender price (if applicable)
1					
2					
3					

# (ii) Other Tenderers [INSTRUCTIONS: insert names of all Tenderers that submitted a Tender. If the Tender's pricewasevaluatedincludetheevaluatedpriceaswellastheTenderpriceasreadout.]

No.	Description and No. of Service Line or Package	[insert name of Tenderer]	[insert Address of Tenderer]	Tender price	Evaluated Tender price
1					
2					
3					

#### 2) How to request a debriefing.

#### **DEADLINE:** The deadline to request a debriefing expires at midnight on [*insert date*] (local time).

You may request a debriefing in relation to the results of the evaluation of your Tender. If you decide to request a debriefing your written request must be made within three (3) Business Days of receipt of this Notification of Intention to Award.

Provide the contract name, reference number, name of the Tenderer, contact details; and address the request for debriefing as follows:

 Attention:
 [insert full name of person, if applicable]

 Title/position:
 [insert title/position]

 Agency:
 [insert name of Procuring Entity]

 Email address:
 [insert email address]

If your request for a debriefing is received within the 3 Business Days deadline, we will provide the debriefing within five (5) Business Days of receipt of your request. If we are unable to provide the debriefing within this period, the Standstill Period shall be extended by five (5) Business Days after the date that the debriefing is provided. If this happens, we will notify you and confirm the date that the extended Standstill Period will end.

The debriefing may be in writing, by phone, video conference call or in person. We shall promptly advise you in writing how the debriefing will take place and confirm the date and time.

If the deadline to request a debriefing has expired, you may still request a debriefing. In this case, we will provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of the Contract Award Notice.

#### **3**) How to make a complaint?

## Period: Procurement-related Complaint challenging the decision to award shall be submitted by [insert date and time].

Provide the contract name, reference number, name of the Tenderer, contact details; and address the Procurement-related Complaint as follows:

Attention:	[insert full name of person, if applicable]
Title/position:	[insert title/position]
Agency:	[insert name of Procuring Entity]
Email address:	[insert email address]

At this point in the procurement process, you may submit a Procurement-related Complaint challenging the decision to award the contract. You do not need to have requested, or received, a debriefing before making this complaint. Your complaint must be submitted within the Standstill Period and received by us before the Standstill Period ends.

In summary, there are four essential requirements:

- 1. You must be an 'interested party'. In this case, that means a Tenderer who submitted a Tender in this tendering process, and is the recipient of a Notification of Intention to Award.
- 2 The complaint can only challenge the decision to award the contract.
- 3. You must submit the complaint within the period stated above.
- 4. You must include, in your complaint, all of the information required to support the complaint.
- 5. The application must be accompanied by the fees set out in the Procurement Regulations, which shall not be refundable (information available from the Public Procurement Authority at complaints@ppra.go.ke
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#### FORM FOR REVIEW (r.203(1))

#### PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

#### BETWEEN

..... APPLICANT

AND

......RESPONDENT (Procuring Entity)

#### **REQUEST FOR REVIEW**

FOR OFFICIAL USE ONLY Lodged with the Secretary Public Procurement Administrative Review Board on......day of ......20......

#### SIGNED

#### **Board Secretary**

#### **3 LETTER OF AWARD**

#### [Form head paper of the Procuring Entity] [date] To: .....[name and address of the Service Provider]

No.	Description and No. of Service Line or Package	[insert accepted Tender Price]	[insert completion period]
1			
2			
3			

You are requested to arrange to sign the Framework Agreement within 28 days in accordance with the Conditions of Contract. On being instructed to commence the contract on any of the packages you have won, by a call-off notification, you will be requested to furnish for the particular Service Line or Package a Performance Security within 28 days in accordance with the Conditions of Contract, and for that purpose, using one of the Performance Security Forms included in Section VIII, Contract Forms, of the Tender Document.

Please return the attached Contract dully signed Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract

#### 4. FORM OF CONTRACT [Form head paper of the Procuring Entity]

#### LUMP-SUMREMUNERATION

This CONTRACT (herein after called the "Contract") is made the [day] day of the month of [month], [year], between, on the one hand, [name of Procuring Entity] (herein after called the "Procuring Entity") and, on the other hand, [name of Service Provider] (herein after called the "Service Provider").

[*Note:* In the text below text in brackets is optional; all notes should be deleted in final text. If the Service Provider consist of more than one entity, the above should be partially amended to read as follows: "... (herein after called the "Procuring Entity") and, on the other hand, a joint venture consisting of the following entities, each of which will be jointly and severally liable to the Procuring Entity for all the Service Provider's obligations under this Contract, namely, [name of Service Provider] and [name of Service Provider] (herein after called the "Service Provider").]

#### WHEREAS

- a) the Procuring Entity has requested the Service Provider to provide certain Services as defined in the General Conditions of Contract attached to this Contract (herein after called the "Services");
- b) the Service Provider, having represented to the Procuring Entity that they have the required professional skills, and personnel and technical resources, have agreed to provide the Services on the terms and conditions set forth in this Contract at a contract price of.....;

NOW THEREFORE the parties hereto hereby agree as follows:

- 1. The following documents shall be deemed to form and be read and construed as part of this Agreement, and the priority of the documents shall be as follows:
  - a) The Form of Acceptance;
  - b) The Service Provider's Tender
  - c) The Special Conditions of Contract;
  - d) The General Conditions of Contract;
  - e) The Specifications and the Priced Activity Schedule; and
  - *f)* The following Appendices: [*Note:* If any of these Appendices are not used, the words "Not Used" should be inserted below next to the title of the Appendix and on the sheet attached hereto carrying the title of that Appendix.]

Appendix A: Description of the

Services Appendix B: Schedule of

Payments Appendix C: Subcontractors

Appendix D: Breakdown of Contract

Price

- 2. The mutual rights and obligations of the Procuring Entity and the Service Provider shall be as set forth in the Contract, in particular:
  - a) The Service Provider shall carry out the Services in accordance with the provisions of the Contract; and
  - b) The Procuring Entity shall make payments to the Service Provider in accordance with the provisions of the Contract.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in the irrespective names as of the day and year first above written.

For and on behalf of [name of Procuring

For and on behalf of *[name of Service* 

Provider] [Authorized Representative]

[*Note:* If the Service Provider consists of more than one entity, all these entities should appear as signatories, *e.g.*, in the following manner:]

For and on behalf of each of the Members of the Service Provider

[name of member]

[Authorized Representative]

[name of member]

[Authorized Representative]

#### PART II – PROCURING ENTITY'S REQUIREMENTS

#### **1.1General Requirements**

#### 1.1.1 Related Work

The Contractor shall, under this section, co-ordinate with the Electrical Section of these Specifications to ensure compatibility with electrical and control components and completeness of supply without extra cost to the Employer.

#### **1.1.2 Shop Drawings and Operating Manuals**

Shop drawings for all units to be furnished under this section shall be provided in accordance with the General Clauses.

#### 1.1.3 Appurtenances, Fittings, Connecting Piping and Accessories

All appurtenances, fittings, connecting piping and accessories necessary for the proper functioning of the equipment or reasonably inferable from the Drawings shall be supplied and installed with the equipment, whether or not indicated on the Drawings or specified herein.

#### **1.1.4 Materials Handling and Storage**

The Contractor shall ensure safe delivery of all materials to the site. Materials are to be handled at all times with care to avoid damage. Loading, unloading and movement of materials into place by means of hoists, ropes or skid ways shall be carried out in such a manner as to avoid shock of any kind resulting from having been dropped or rolled against one another.

The Contractor is to ensure that materials and equipment are properly stored and protected onsite against weather, damage and theft to the satisfaction of the Engineer.

#### 1.1.5 Materials and Workmanship

Furnish under this contract only materials and equipment which are first-class in every respect and can be constructed and finished in a workmanlike manner. Use materials suitable for the service intended and selected and fabricated in accordance with the best engineering practice. Equipment shall be modern in design and shall not have been used at any time previous to delivery except as required by tests.

## **1.1.6 Concrete Equipment Bases**

Unless otherwise recommended by the equipment manufacturer, equipment shall be finally set on 25 mm of cement grout, on a 150 mm high 'housekeeping' concrete base, chamfered at the edges.

Where equipment is to be set on a concrete base, the concrete base itself shall be anchored to the floor slab with cast in-place reinforced steel. If bases are to be cast onto an existing floor, the steel shall be epoxy grouted a minimum of 150mm deep into the existing concrete. The existing concrete shall also be roughened and coated with a suitable epoxy immediately prior to plating of the plinth or housekeeping base so as to ensure a good bond between the existing and new concrete. Concrete used in paths and housekeeping bases shall be 30 MPA concrete (Class C25).

#### **1.1.7 Anchors Bolts**

Unless otherwise specified, anchor bolts for equipment shall be of stainless steel type 304 or cadmium plated steel having ample size for the purpose intended. They shall be set by the Contractor in accordance with the manufacturer's reviewed shop drawings.

#### **1.1.8 Electric Motors**

Unless otherwise specified electric motors shall be of high efficiency, totally enclosed, fan-cooled, tropicalised class F. insulation, Class B temperature rise with anti-condensation heaters, 1.15 service factors; all copper windings (rewindable).

## **1.1.9 Direct Connected Motors**

Provide flexible shaft couplings to motors directly connected to pumps or equipment.

## **1.1.10 Guards**

Cover all belt drives and motor shaft couplings with a suitable guard.

## **1.1.11 Motors**

Unless otherwise specified, electric motors supplied for equipment under this Section shall be of the high efficiency totally enclosed fan-cooled, tropicalised class F. insulation, Class B temperature rise with anti-condensation heaters, 1.15 service factors; all copper windings.

- Less than 0.375 kW: 240V/1 p/50Hz power supply;
- 0.375kW and larger: 415V/3 p/50Hz power supply;
- Enclosure: TEFC, Corrosive Chlorine Atmosphere;

• Service Factor: 1.15

## 1.1.12 Standards

The design and construction of systems and equipment shall comply with the requirements of these Specifications and:

- ASME Codes or equivalent BS standards;
- Chlorine Institute Standards or equivalent BS standards.

In case of conflict among the requirements those with the higher standards shall apply.

# **1.2Dosing Pump Units**

# **1.2.1 Design Workmanship and Construction**

The Pump shall be designed and built for continuous operation and suitable for starting against an open valve. Similar pumping units shall be of identical design and manufacture with corresponding parts interchangeable

Castings shall be free from flaws and imperfections and machined surfaces shall be finished true. All joints shall be machined and all castings shall be shop faced for nuts. All similar parts shall be made to similar gauge wherever possible.

The inside and outside corners and edges of all castings shall be rounded off, wherever possible, with fillet and chamfers. All screws, bolts and nuts shall be US Standard or metric standard, as specified under CLASS 1.8. large nuts 30 mm and larger shall have bronze cotter pins. No patching, plugging, shimming or other such means of overcoming defects, discrepancies or errors shall be resorted to without the written permission of the Engineer.

The drives shall have adequate capacities to run the pumps at all conditions of operation. All pumps shall be statically and dynamically balanced.

# **1.2.2 Duty Pump Design**

The contractor shall supply standard pumps and motors (commonly available).

# **1.2.3 Pump Type and Configuration**

The required pump type is a horizontal, end suction and radial/side discharge, multi stage, mixed flow type, electric motor driven surface centrifugal pump. The centrifugal pumps shall comply with the relevant clause of the general specification.

All pumps and associated equipment are to be derated for an ambient temperature of 35 degree Celsius and an altitude of 1355 masl.

Pumps are to be selected to transfer water from any water level in the suction well to the receiving Reservoir, having due regard to the range of water levels and possible friction losses. In particular;

- When pumping against the maximum head with all pumps in operation, each pump must have an adequate throughput for cooling
- With one pump running alone, the selected pump must not overload its motor when pumping against the minimum possible head
- The pump curves must be sufficiently steep to avoid excessive draw downs when pipe friction losses are low
- The selected pumps shall be free from cavitation at all times

The pumps shall be protected against low water level in the wet well/reservoir using an electrode probe and a protection relay (installed in the starter box of the centrifugal pump compartments).

The metering instruments shall be calibrated in metric units, namely cubic metre for water meter and metre or bar for pressure gauge. The pressure gauge shall be connected by a three-way cock.

Surge vessels sized for the pipeline system will be installed on the common discharge pipe on the sites shown in the drawings.

For the pump station at the treatment plant, the existing common suction and common discharge pipelines will be utilized, making modifications only to the tees and bends on the common suction and discharge pipelines which connect to the independent suction and discharge pipelines of each pump.

# 1.2.4 Scope of Work

The contractor's duties shall include but not limited to;

• supply & delivery of the equipment to site

• Install pump with power & level control cables, control panels, headwork's piping, pressure gauge, water meter, non-return valve, gate valve, air release valve etc, lifting equipment at each pump station

• Connect station piping to the suction wet well & to the discharge collector pipe

• Connect collector piping to the suction wet well & to transmission pipe at the discharge valve chamber

- install trash rack, gate & sundry metal works
- install control cables from each pump station to delivery reservoir or as required

• Connect the pump power & control cables to the panel board in the pump room at the pump site and conduct pump test

• Commissioning of equipment & training of the staff.

# **1.2.5 Scope of Supply**

The supply shall include the following items among others as indicated in the corresponding drawings;

- pumps with power & control cables, pump control panel
- suction & delivery piping
- Non-return valves
- Gate valves
- Butterfly valves
- Air release valves
- Pressure gauges
- Pressure switches
- Piping to connect pump to the suction wet well outlet pipe
- Piping to connect pump to the discharge (collector) pipe.

# **1.2.6 Pump Construction**

(a) Casing:

• close grained high tensile cast iron to ASTM A-278 class 25 or equivalent; or ductile from ASTM A-395;

• back pall out design with flanged suction and discharge nozzles cast integrally with the main pump casing;

• suction and discharge flanges to ANSI clam 125, faced, drilled and spot faced;

- provide tapped openings for drain and gauge connections;
- hydrostatic to 1.5 times the sum of maximum suction pressure and shut off head;
- Provide lifting lugs or eye bolts.
- (b) Impellers:
- bronze, cast in one piece;

• enclosed, non-overloading type, secured to the shaft by a key and locked in place;

- Statically and dynamically balanced.
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(c) Wearing Rings:

- Provide wearing rings for casing and impeller;
- renewable bronze or a combination of bronze and stainless steel;
- Where suitable, double labyrinth type design is preferred.

# (d) Shaft:

• high grade carbon steel, heat treated, annealed, machined and polished; adequately sized to take all kinds of loading without vibration and fatigue failure;

• fitted with sleeves of corrosion-resistant iron- chromium alloy (11 to 14% Cr.) or equivalent, easily replaceable design. Provide O-ring type seals to prevent leakage.

(e) Stuffing Boxes:

• designed for integral water scaling;

• bronze lantern gland packed with PTFE or Nitril Synthetic Fibre or equivalent, no asbestos, and non-toxic packing material;

• provide drip boxes and tapped drainage opening allow collection of waste SCW water to drain;

• provide defector or slinger rings to prevent entry of water into the bearings.

(f) Bearings:

- designed to take line and thrust loads under all operating conditions;
- anti-friction type, sized and rated for at least 100,000 hours B-10 Bearing Rating Life;

• Oil or grease lubricated.

# **1.2.7 Pump Accessories**

(a) Couplings:

• forged steel, gear type flexible shaft coupling or Fenner "tyre type" with spacer to connect pump and motor;

• designed to transmit full power limit end play of motor; absorb angular and parallel misalignment as well as axial movement due to vibration or thermal expansion and contraction of pump and motor;

• provide coupling guard of expanded metal construction, properly anchored to the base plate.

(b) Base plates:

• heavy cast or welded steel common base plate with machined hub for mounting both pump and motor;

• provide: grouting holes; drilled lugs for anchor bolts; drain gutter around pump area, fitted with 25 mm dia. drain connection;

• both pump and motor shall be assembled in the shop for initial alignment and doweling.

## **1.2.8 Pressure Gauges**

- provide suction and discharge pressure gauges for each pump;
- 100 % accuracy over 90 % of range;
- 150 mm dia. Bourdon tube;
- black phenol case;
- supply snubbers and isolating cocks;

• range (dual graduation): suction -10 m to + 10 m (water bend); discharge 0 to + /- (Closed Valve Pressure + 20 m).

# 1.2.9 Motors

Motors to meet Electrical specifications.

# **1.2.10 Shop Painting**

All non-machined surfaces of the pumping units shall be thoroughly cleaned and smoothed before painting. Surface preparation shall conform to Specification SSPC-SP-6 'Commercial Blast Cleaning'.

The interior of the horizontal pump casting shall be given three coats of an approved taste and odour free paint before shipment Exterior surfaces of the pumps shall be primed with two coats of Epoxy Ester Phenolic primer, dry film thickness of 38 to 50 mil. Electric motors may be supplied with the manufacturer's standard finish, colour as directed by the Engineer. Other machined surfaces such as shafting shall be well coated with grease or anti-rust compound before shipment.

# **1.2.11 Anchor Bolts**

The Contractor shall furnish anchor bolts of type 304 stainless steel having ample size for the purpose intended.

They shall be set by the Contractor in accordance with the Manufacturer's approved working drawings.

# 1.2.12 Shop Tests

All pumps shall be tested in accordance with the 'Hydraulic Institute Standards' Test Code for centrifugal pumps. Each pump shall be guaranteed for the rating capacity and efficiency when operating at the specified conditions of head and load.

The pumps shall be shop tested by the manufacturer over their range of operation from shutoff pressure to a point at least 20% beyond the point of rated capacity. A certified test curve in duplicate showing head, capacity, efficiency and power shall be furnished to the Engineer for review.

Standard commercial shop tests shall be carried out on motors and certified data submitted to the Engineer for review.

The Engineer reserves the right to witness any of the pump and motor test without extra cost to the Employer.

#### **1.2.13 Installation of Pump Units**

All pumping units shall be installed by the Contractor in accordance with the manufacturer's instructions reviewed by the Engineer. Only mechanics with at least 3 years experience in the installation of rotating machinery shall be employed.

#### 1.2.14 Supervision

A Supervision period of two days shall be allowed for manufacturer's representatives to inspect the installation of the equipment, to start up the equipment and to instruct operating personnel in its operation and maintenance. This period may be divided into two or more separate periods as required by the Engineer.

#### 1.2.15 Field Tests

The pumping units supplied shall be tested by the Contractor and manufacturer's representative and witnessed by the Engineer after installation to ensure that the specified requirements are met, and that the operation of the unit is satisfactory in all respects. In the event of any unit failing to meet the requirements of these specifications, the Engineer reserves the right to reject it. Subsequently, the equipment shall be repaired or made good to the satisfaction of the Engineer.

#### **1.2.16 Spare Parts**

Two years supply of spare parts essential for regular servicing of equipment as recommended by the manufacturer or indicated in the service manuals is required. The spare parts for each pump shall at least include the following items;

- Shaft sleeves;
- wearing rings;
- bearings (line & thrust);
- packing gland complete with cages;
- gasket material (no. of changes);
- packing material (no. of changes);
- Complete set of spare fuses or MCB's as required
- Spare coils and contactors for starters
- Spare overload relays and contacts for starters
- Recommended spares for control systems
- Service kit, Bearing, Mechanical seal, Packing gland etc. for surface pumps & motors
- Recommended service parts and spares for generator sets and control panels
- Any other spares recommended by the manufacturer

All spare parts shall be new, unused and strictly interchangeable with the parts for which they are intended to be replacements. The parts shall be treated and packed for long storage under the climatic conditions prevailing at the site. Each spare part shall be clearly marked or labelled on the outside of its packing with its description and purpose.

When more than one spare is packed in a single case or other container, general description of its containers and other packages shall be marked and numbered in an approved manner for purposes of identification.

# **1.2.17** Certificates of Installation

On completion of installation and testing, the manufacturer's certification of the correctness of the installation shall be submitted to the Engineer.

# 1.2.18 Painting

All piping supports, valves, and equipment shall be cleaned and all rust, dirt, grease and oil be removed, whether such items are to be painted or not.

All items of equipment supplied under this Section shall receive shop painting consisting of one primer coat and two finish coats. All steel work, other than galvanised, plated or stainless steel, shall receive at least one coat of zinc chromate-alkyd primer. Finish painting, where required, to the colours to be selected by the Engineer.

All scratched and marred finish and primer coats shall be retouched to the satisfaction of the Engineer.

# **1.2.19 Specific Specifications of the pumps** *Pump Component Material Specifications*

Item	Compone	ent		Material	
1	Basket str	strainer		Stainless steel to ASTM grade 316	
2	Suction co	over		Cast iron, alternatively phosphor	
				bronze CT1 to BS 1400	
3	Shaft slee	ves		Stainless steel to ASTM grade	
				316	
4	Bearing b	ushes		Leaded bronze LB2 to BS 1400	
5	Pump diff	fuser		Cast iron, alternatively phosphor	
				bronze CT1 to BS 1400	
6	Impeller			Stainless steel to ASTM Grade	
				316	
7	Wearing		rings,	Gunmetal LG2 and leaded	
	impeller		and	bronze LB2 to BS 1400	
0	casing				
8	Shaft nut			Phosphor bronze CT1 to BS	
0	D 1	<u>C</u>			
9	Pump sha	It		Stainless steel, chromium	
				nickel, copper	
				$\begin{array}{ccc} \text{molybdenum.} 25/5/2 & \text{to} & \text{BS} \\ 0.780 & & \end{array}$	
10	Stude n	140	and	$\frac{2709}{\text{Stainlass}}$	
10	unashars	uts	anu	aluminium bronze AB2 to BS	
	washers			1400	
11	Tube adar	otor		Leaded bronze LB2 or gunmetal	
				LG2 to BS1400	
Relevant Brit	tish and Ar	nerican S	tandards		
Cast Iron	F	<b>3S</b> 1452		Grade 220	
Phosphor	E	3S1400		Grade PB1 or CT1	
bronze					
Leaded	E	3S1400		Grade LB2	
Bronze					
Gunmetal	E	BS 1400		Grade LG2	
Aluminium BS 1400			Grade AB2		
bronze					
Stainless	E	<b>BS</b> 970	or 278	9 Grade 316	
steel	Æ	ASTM			

Line Shafts and Column Pipes

The line shaft shall be of machine ground stainless steel running within an

Item	Component		Material
1	Shaft, keys	and	Stainless steel, chromium, nickel,
	couplings		copper, molybdenum. 25/5/3/2 to
			BS 2789
2	Enclosing tube		HFS carbon steel. BS 3601 Grade
			HFS 360 or equivalent
3	Column pipe		HFS carbon steel. BS 3601 Grade
			HFS 360 or equivalent
4	Bolts, nuts,	and	Stainless steel. BS 970 pt 4
	washers		

Line shaft and Column Material Specifications

enclosing tube carrying clean lubricating water. Intermediate couplings shall be positioned above each bearing and they shall be of a self-aligning type, adequately keyed and threaded to carry torque and axial load. Renewable sleeves shall be provided where the shaft passes through the bearing bushes. The bottom bearing and all intermediate bearings shall be of the cutlass rubber type and shall be spaced to ensure steady running of the shaft at not more than 75% of its first critical speed. The column pipe shall be flanged and spigotted into the sandwich bearing body and sealed by means of "O" rings. The enclosing tube shall be "O" ring sealed above and below the bearing body.

The enclosing tube shall be "O" ring sealed above and below the bearing body. The headgear stool is to be provided with a water lubricated, packed stuffing box and gland where the shaft emerges from the column pipe. The shaft shall have a renewable sleeve where it passes through the stuffing box and the gland shall be split and held by swing bolts. The column pipe shall be designed and fabricated with proper regard to the head room available for removal, hydraulic and mechanical efficiency, static and dynamic stresses and such other properties as will ensure rigid, vertical suspension and vibration—free running and operation.

The material specifications for line shafts and columns are shown in the table below.

## Line Shaft Lubrication

The line shafts shall be lubricated via the existing 50mm clean water supply pipe from the high lift pump station. The existing pumps are supplied from a common manifold running adjacent to the main discharge manifold. The contractor shall ensure that the line sizes and pressures are suitable to provide reliable and adequate lubrication of the line shaft bearings. The supply is provided at a pressure of approximately 42 m water head. Control provisions shall be arranged to ensure that bearing water lubrication is occurring before a pump starts.

# Head Gear

The upper end of the column pipe shall be bolted to the underside of the head gear stool base plate in such a way as to permit easy assembly and disassembly. The head gear stool shall be of heavy fabricated steel construction of such weight and rigidity as to ensure that the pump runs without undue vibration. In the case of dispute regarding undue vibration, the amplitude of the vibration shall be measured at the upper end of the line shaft, and if the amplitude is found to be in excess of 50% of the acceptable field limit of the ISO 7919-2:2009, then the cause of the vibration shall be fully investigated by the Contractor and shall be made good at the Contractor's expense.

The head gear stool shall provide easy access for inspection and removal of the shaft gland, thrust bearing and the coupling which connects pump and motor shafts. The mating faces of all components located concentrically about the vertical axis of the shaft shall be spigotted to ensure correct alignment, except for the motor which is to be dowelled in position after final alignment of the coupling. The stool shall also permit easy access for vertical adjustment of impeller clearances and enclosing tube as necessary.

The main thrust and journal bearing shall be of taper roller, grease lubricated type and must be capable of withstanding reverse rotation for 15 minutes in the event of backflow. The pump shaft /motor shaft coupling shall be of an appropriate type and adjustable to permit impeller positioning, splined or keyed to the shafts.

#### 400 V Motors

The motors shall be suitable for indoor operation at an elevation between approximately EL 1 050 m with an ambient temperature of  $40^{\circ}$ C and a relative humidity of 80%. The motors shall be designed in accordance with the latest IEC, BSI or NEMA standards and shall, in particular, suit the torques and speed characteristics of the pumps.

## Ratings

The motors shall be rated for 400 V, 3 phase, 50 Hz service. They shall be 1 500 rpm synchronous speed, continuous duty with a duty type S1. The motors shall be of high efficiency type and shall be equipped with power

factor correction capacitors to maintain a power factor of at least 95% at the design point.

#### Construction

The motors shall be vertical, squirrel cage induction type, constant speed motors. They shall be high thrust, open drip proof and suitable for full voltage starting and shall have Class F modified insulation to IEC 85 or equal standard. The full load temperature rise shall not exceed Class B by resistance method above 40°C ambient.

Each motor shall be designed and certified for 85 dBA maximum sound pressure level measured 1.5 m distant from the pump in any direction. Each motor shall be equipped with a minimum of three positive temperature coefficient thermistors connected in series, with leads brought out to a suitable terminal box. The motor frame and end shields shall be made of cast iron and all exterior and interior surfaces shall be primed and finished in accordance with manufacturer's standards. Threaded drain holes with plugs shall be provided in the lowest points of the motor enclosures to permit drainage of condensate. All openings in the motor enclosures shall be vermin proof. All machined fits shall be coated with corrosion resistant material. All hardware such as bolts and nuts shall be made of corrosion resistant material. Terminal boxes shall be of cast iron or heavy gauge cold rolled steel construction, diagonally split and suitable for 4 (four) 90-degree positions. Gaskets shall be furnished at the boxes to seal out liquids. Motor leads shall pass through a watertight grommet or gasket seal where they enter the boxes from the stator frames. Boxes shall be tapped for standard conduit or cable connector openings. Terminal boxes shall be properly sized for cable terminations.

All motors shall be equipped with 230V AC space heaters to prevent condensation when the motor is de-energised. Heaters shall have a sheath of chrome steel or other corrosion resistant alloy. The surface temperature of each space heater shall not exceed 60°C. Space heater leads shall be brought out to a space heater terminal box, adjacent to the motor terminal box. All leads shall be properly identified.

Motors shall be equipped with properly sized grounding lugs in the terminal boxes. The motor frames shall have provision for grounding. All motors shall be equipped with grease lubricated rolling element bearings and fittings.

The motors shall be suitable for at least 4 starts per hour.

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#### **1.3Penstocks Specifications 1.3.1 General**

Sluice gates shall be furnished with a handwheel crank-operated floor stand having not less than a 2:1 gear ratios or electric motors, as shown, and shall conform to AWWA Standard C501, except as otherwise specified herein. The Contractor shall furnish all material, labor, equipment and incidentals required to produce a complete installation ready for operation. All equipment shall be manufactured by reputable firms having at least 15 years experience in the design and fabrication of such equipment. All gates and appurtenances shall be furnished by one manufacturer. Gate assemblies shall be shop tested and manufacturer certified to meet the maximum heads shown on the Drawings.

# **1.3.2** Coatings

Each gate together with wall thimble and all accessories shall be epoxy-coated as specified in Subsection 6.2.4. Care shall be exercised to protect all machined surfaces during sandblasting and coating. All damage to surface coatings incurred during shipment and/or installation shall be repaired to the satisfaction of the Engineer prior to installation.

## **1.3.3 Frames and Guides**

a) All sluice gate frames and guides shall be of one-piece cast iron construction, designed to withstand the total thrust due to the seating and unseating water pressure and the wedging action, and shall be of the flange back type with rectangular or circular opening as shown. All contact surfaces shall be machined, and grooves machined the entire length of the guide to allow 1.6 mm clearance between the disc tongue and the guide groove. The guides shall be of such length as to support at least  $\frac{1}{2}$  the slide in the fully open position. The guides shall be attached to the frame with studs and nuts of Type 316 stainless steel.

b) Bronze wedge seats shall be securely attached to machine pads on the guides. Each frame shall have machined dovetail grooves on the front face into which bronze shall be driven and machined to a 0.1 mm finish. The back flange of the frame shall be machined to bolt directly to the machined face of a wall thimble. Frames for sluice gates subject to unseating pressure shall have integrally cast pads machined with key ways to receive top and bottom wedge seats.

## **1.3.4 Discs**

a) The disc shall be of cast iron, one-piece, rectangular construction with integrally cast vertical and horizontal ribs. A reinforcing rib along each side

shall be provided to ensure rigidity between the side wedges. The disc shall have machined dovetail grooves on the seating face into which bronze seating facings shall be driven and machined to a 0.1mm finish. A tongue on each side extending the full length of the disc shall be machined on all sides with a 1.6mm clearance between the disc tongue and the gate guide groove. A heavily reinforced nut pocket shall be cast integrally on the vertical centerline above the horizontal centre and shall be of a shape designed to receive the square backed bronze thrust nut. The pocket shall drain freely. The maximum clearance between seating surfaces, with the gate in the closed position shall be 0.1 mm.

b) Unless otherwise shown, the sluice gate shall be of flush-bottom closure where indicated with a compressible resilient seal attached to the bottom of the disc with Type 316 stainless steel bar and fasteners. The seal shall produce a wide sealing are on a machined cast iron stop bar bolted and keyed to the gate frame and forming a flush bottom. The differential sealing pressure of the resilient seal on the stop bar shall be adjustable using the side wedges of the gate.

## 1.3.5 Wedging

Wedges shall be provided to ensure practical water tightness. At a minimum, gates subject to seating pressure shall have side wedges, and gates subject to unseating pressure shall have top, side and bottom wedges. Wedges shall be solid, of cast bronze and machined on all contact surfaces. They shall be attached to the disc with Type 316 stainless steel studs, nuts and adjusting screws with locknuts.

## **1.3.6 Seat Facings**

Seat Facings shall be extruded bronze of a composition resistant to dezincification, and shall be shaped to permanently lock in the dovetail grooves when pneumatically impacted into place. Attaching pins or screws will not be allowed.

## 1.3.7 Wall Thimbles

All sluice gates shall be furnished and installed with cast iron, E or F-pattern wall thimbles to match the thickness of the walls in which they are installed. The thimbles are to be supplied by the gate manufacturer, and shall be machined and tapped to match the gate frame. The alignment shall be clearly marked, and the thimble sized to withstand all reasonable construction and operational stresses. The thimbles shall be of one-piece cast iron construction, and have a centred stop ring. A permanent gasket of uniform thickness shall be provided between the sluice gate and the thimble.

#### 1.3.8 Stems

Operating stems to Type 316 stainless steel shall be provided and shall be of sufficient size to withstand the stresses induced by normal operation without buckling or permanent distortion. Stem guides shall be provided to ensure that the L/R ratio does not exceed 200. The stem shall be designed to transmit in compression at least twice the rated output of the floor-stand

without distortion. Multi-section stems shall be connected with interchangeable bronze couplings threaded and keyed to the stems. Threading shall be subject to the Engineer's approval.

## 1.3.9 Stem Guides

Stem guides shall be bronze bushed cast iron, and mounted on cast iron brackets. They shall be adjustable in two directions and spaced not further apart than 3.0m and not to exceed and L/R ratio of 200.

#### 1.3.10 Stem Covers

Clear, plastic stem covers shall be provided for all sluice gates. The stem covers shall be strong, tough butyrate plastic which resists breakage and remains clear during outside service. The stem covers shall be mounted on the floor-stands by cast aluminium adaptors.

#### **1.3.11 Anchor Bolts**

Anchor bolts shall be furnished and installed where shown on the Drawings or directed, and shall be of Type 316 stainless steel.

#### **1.3.12 Manual Operating Mechanisms**

Operators shall be equipped with stem covers and shall be mounted on weather proof cast iron or fabricated steel pedestals. The pedestal shall have an ample base area to evenly distribute the load to the supporting concrete structure. The centerline of the manual operator shall be approximately 1.0 m above the base of the pedestal. Sluice gate hoist heads shall be cast iron. The operating nut shall be of solid 85-5-5-5 bronze. Operating thrust shall be taken on roller or ball bearings. All parts shall be provided with an alternative lubrication system. The unit shall be designed so that a maximum of 18kgf effort on the crank will operate the gate. Clockwise movement of the crank shall close the gate. The operating crank shall be easily removable to facilitate the use of a portable power operator.

## **1.3.13 Electric Motor Operated Sluice Gate Assembly**

Each electric motor-operated sluice gate control assembly shall include the motor operator, reduction gearing, limit switch gearing, limit switches, torque switches, reversing starters, fully machined drive sleeve, declutch

lever, clear plastic stem cover, auxiliary handwheel and a cast iron floor-stand as a self contained operator. The electric motor operator shall confirm to Clause 9.3 except as required elsewhere or as directed by the Engineer.

The penstocks shall be electrically driven, water-lubricated, enclosed vertical spindle type with below floor discharge branches. They shall be designed specifically to give trouble free operation without the need for frequent withdrawal for inspection, overhaul or repair. Consequently the gate thicknesses, sliding seals spindle diameter and thicknesses, etc shall be generously designed so as to provide a high degree of reliability. The penstock materials shall be at least of the quality specified below and Bidders who wish to recommend different materials of higher quality in order to enhance the reliability of the penstocks and minimise component corrosion or wear shall be free to do so. Such recommendations shall be shown in the Technical Data Sheet in Section IV – Bidding Forms. Where components of dissimilar material are used for adjacent components and these would be prone to corrosion if they come into contact, they shall be separated by suitable protective material. Routine maintenance shall, as far as possible, be such that it will not require the attention of highly skilled personnel.

Bidders shall provide substantiated evidence of reliability and corrosion/wear resistance for equipment similar to those offered that have been installed elsewhere and have been operating under similar conditions.

The penstocks shall comply with the appropriate BSI or AWWA or ISO Standards and this information shall be submitted as part of the supplementary technical information that accompanies the Bid. All penstocks shall be Works and Site tested in accordance with the specifications below.

## **1.3.14 Additional features**

The penstocks shall be provided with corrosion resistant material. All casings shall be corrosion free/ stainless steel.

Headstocks shall have cast iron pillars and hand wheel and incorporate ball bearings. Hand wheel shall be adequate diameter so as to follow one-man operation without excessive effort, and if necessary shall be geared. Extension spindles shall be made of stainless steel, with sufficient number of cast iron guide brackets provide to prevent distorting of the spindle. Guide brackets shall be "bolt on" pattern complete with fixing bolts. Penstocks with a width exceeding 1.2 m shall be equipped with two spindles.

Generally: The control valve actuator shall be suitable for remote control, local control, and manual control. The unit shall be equipped with limit switches for end positions, position feedback potentiometer for regulation, and position indication as well as all necessary control and monitoring devices. The control and monitoring panel shall be part of the common control board/cabinet.

The actuators shall be designed in such a way that following the failure of the actuator, the shut-off element may still be actuated manually (handwheel or similar device). The actuators shall be perfectly suitable for the duty intended (opening and/or closing and regulating the control valve) under the specified differential pressures and ambient conditions. The actuators shall be equipped with limit switches for both end positions, and if the corresponding valve has a control function, a position feedback potentiometer for regulation and position indication as well as all necessary control and monitoring devices will have to be provided. The minimum protective system for the electric actuator unit shall be IP 55. All actuators are to be equipped with limit switches as well as with torque limit switches. If the standard equipment comprises a thermal protection, this thermal protection is to be integrated in the control system. The actuator units are to be delivered for a voltage of 220 - 230 / 380 -

400V. The limit switch and safety limit switch messages are to be issued as potentialfree contacts. An anti-condensation heater is to be envisaged. With valves which are exclusively operated by hand, the corresponding values according to DIN 3230 are to be met. The closing times of the electrically operated valves will have to be in accordance with the hydraulic calculation.

The motors shall be horizontal, squirrel cage induction type, constant speed motors. They shall be high thrust, open drip proof and suitable for full voltage starting and shall have Class F modified insulation to IEC 85 or equal standard. The full load temperature rise shall not exceed Class B by resistance method above 40°C ambient.

Motors shall be equipped with a minimum of three positive temperature coefficient thermistors connected in series, with leads brought out to a suitable terminal box. The motor frame and end shields shall be made of cast iron and all exterior and interior surfaces shall be primed and finished in accordance with manufacturer's standards. Threaded drain holes with plugs shall be provided in the lowest points of the motor enclosure to permit drainage of condensate. All openings in the motor enclosures shall be

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vermin proof. All machined fits shall be coated with corrosion resistant material. All hardware such as bolts and nuts shall be made of corrosion resistant material. Terminal boxes shall be of cast iron or heavy gauge cold rolled steel construction, diagonally split and suitable for 4 (four) 90-degree positions. Gaskets shall be furnished at the boxes to seal out liquids. Motor leads shall pass through a watertight grommet or gasket seal where they enter the boxes from the stator frames. Boxes shall be tapped for standard conduit or cable connector openings. Terminal boxes shall be properly sized for cable terminations.

All motors shall be equipped with 230V AC space heaters to prevent condensation when the motor is de-energised. Heaters shall have a sheath of chrome steel or other corrosion resistant alloy. The surface temperature of each space heater shall not exceed 60°C. Space heater leads shall be brought out to a space heater terminal box, adjacent to the motor terminal box. All leads shall be properly identified.

Motors shall be equipped with properly sized grounding lugs in the terminal boxes. The motor frames shall have provision for grounding. All motors shall be equipped with grease lubricated rolling element bearings and fittings.

The motors shall be suitable for at least 4 starts per hour.

#### 1.4Surge Vessel And Air Compressor 1.4.1 General

## The Surge Vessels shall be installed at the Raw Water Pump station to protect the pumping main from the adverse affects of the water hammer when the pumps trip off due to power failures or sudden stoppage of the pump. The Surge Vessels shall consist of a vertical steel tank, enclosed bladder, compressor, connection valve, pipes and all necessary appurtenances to arrest surges in water pumping main. The surge vessels and accessories should be supplied by a single manufacturer who will also provide analysis on the selected size. The supply and services include:

- Design of the surge vessels
- Supply of surge vessels as described below
- Installation of the surge vessel
- Construction of suitable concrete base for the surge vessel
- Supply and installation of necessary pipes and fittings, valves etc., necessary for smooth function of the surge vessel.

# 1.4.1.1 Type

Surge vessel shall be of air pressured vertical, bladder type suitable for open-air installation, subject to the condition that vessel capacity shall not be less than  $1 \text{ m}^3$ . If there is any deviation in vessel capacity, details of the surge analysis calculations shall be submitted. For this calculation the Contractor can obtain the basic data from the given pump specifications and detail drawings. Detailed drawings showing materials of construction shall be submitted to the Engineer before fabrication of the vessel.

# 1.4.1.2Quality Assurance

The surge vessel manufacturer shall be certified according to the relevant authority (BSI, ISO etc.) for the manufacturing facility of the surge vessel. The Contractor is responsible for obtaining the necessary approvals from the relevant authorities for legal operation on the Site under the ruling conditions of operation. Total Quality Assurance system shall comply with ISO BS 5750, ISO 9001 or 9002 series/BS EN ISO 9001 or 9002 series or an equivalent acceptable to the Engineer. The certificates valid for current production (years 2012/13) shall be submitted together with detailed drawings.

## 1.4.2 Vessels

## 1.4.2.1 Vessel Design

The surge vessel shall be made of welded steel shells and dome ends according to BS 1501 Part 1 or equivalent. The volume of the tank and operating pressure shall be IN accordance to the calculation given by the manufacturer subject to a minimum of 1 m<sup>3</sup>. The vessels shall each be provided with a manhole access and a drainage system. The vessels shall be of vertical type and mounted on legs. The vessel shall be provided with all necessary pipe works, valves etc., and connections, tapping points for instrumentation, vents and drains and a pressure gauge. The vessel shall be protected with a safety valve and volume of vessel shall not be less than 1 m<sup>3</sup>. The Surge vessel shall be designed for anchor bolting to a concrete foundation. The supports shall be designed to with stand all natural loadings, any hydraulic and pneumatic thrusts resulting from surges.

# 1.4.2.2 Painting

The surge vessel shall be painted as indicated below:

- Internal coating Food quality epoxy paint approved by paint manufacture with a 10 year warranty.
- External coating 3 coats of epoxy, approved by a paint manufacturer with a 10 year warranty.

• External coating colour-Shall be Sky Blue .

# 1.4.2.3 Bladder

The bladder shall be made out of butyl and shall be easily replaceable. It shall be suitable and approved for use in drinking water systems. The bladder shall be perfectly watertight and airtight after the installation inside the vessel.

## 1.4.2.4Fittings and Instruments

Each surge vessels shall be equipped with the following:

- Flanged outlets
- Inspection hole
- Drainage plug
- Glass tube levels indictor with an isolating valve
- Pressure gauge with isolating valve
- Safety valve
- Air inflation plug

Supporting legs

1.4.3.1

- Lifting lugs
- Air Compressor

• Sluice valves with necessary by pass arrangement with orifice plate to cater return wave if necessary.

# **1.4.3 Factory Testing**

## Materials

Strength tests of the steel, Butyl and welded joints of the surge vessel shall be performed in accordance with the applicable standards. The Contractor shall furnish the Engineer with certified copies of the results of all tests along with the standards.

# 1.4.3.2 Hydraulic Test

The surge vessel shall be hydrostatically tested at 1.5 times the maximum working pressure for not less than 60 minutes. During the test, the vessel should not show any undue deflection, signs of weakness at any point or leaks through welded joints/ gaskets or other defects. The Contractor shall furnish the certified copy of test results to the Engineer.

# **1.4.3.3 Performance Test**

The surge vessel shall be factory tested for its performance. The Contractor shall submit the test results before shipment of the vessel.

# 1.4.3.4 Surge Vessel

The supplier shall submit all the calculations if necessary and details related to the above surge vessel as per the specifications. The surge vessels are to be installed at locations shown on the drawings.

Description	-	s I I	Surge vessel at Intake Pump station
Maximum ve	ssel capacity		(indicate)
Base plate co	efficient		(indicate)
The pressure the pipe line	allowable range in	Min imu m Ma xim um	-0.6 25 bars
Expected part	icle size		

# Raw Water Pump station

The vessels shall be designed to maintain the pipeline pressure within the range mentioned above. For basic data required for surge analysis, please refer data given under pump specification and the Drawing.

# **1.4.4 Specifications for Air Compressor**

## 1.4.4.1 Scope

The compressor shall be integrated units with vertical or horizontal tank and piston compressor aggregate mounted on the top and total product should be confirmed to ISO/BS standards. The compressor shall be compatible with the surge vessel specification, to create necessary pressure requirement of the above surge vessel.

## 1.4.4.2 Design

The compressor unit shall be protected against corrosion.

The unit shall be equipped with: oil separator for oil free outlet of compressed air, pressure regulator, and suction filter, automatic pressure control of start and stop of the compressor aggregate, line circuit breaker and water trap. Mains supply: 400 VAC, 3 Ph, 50 Hz Starting method : DOL

(Direct On-Line) Maximum allowed noise pressure : 85 dB @ 1m. The compressor with tank may be regarded as pressure vessel and thus they shall be supplied with approval for operation in Kenya from the relevant authorities.

Туре	Capacity	Maximu	Туре	of
	(lit)	m	connectio	
		pressure/	n	
		(bar)		
Reciproca	50 -100	10	Flexible	
ting type,			Hose	up
with			to	
squirrel			connectio	
cage,			n	
three				
phase				
induction				
motor				

#### **DETAILS TO BE PROVIDED FOR APPROVAL** Surge Vessel

Ma	ke	&	Country	of Man	ufacture	

Name and address of Manufacturer's factory E-mail Address Fax/Tel	
Туре	
Model	
Volume of the cylinder (m3)	
Standard to which the Surge Vassal is Manufactured	
Maximum Working Pressure	
Maximum and minimum surge pressure of the pumping main without the surge vessel	

Maximum and minimum surge pressure of the pumping system with the surge vessel operation

Material of construction

a. Vessel

b. Bladder

Are all fittings and instruments specified available

Indicate quality of painting a Internal b External

Operating principle

Adjustable Range

#### **Air Compressor**

Make & Country of Manufacture

Na	ame	and address of Manufacturer's factory E-mail Address Fax/Tel
Ty	rpe	
M	odel	
Ca	apac	ity (m3/hr)
D	live	ry pressure m / bar
Ca	sing	Material
Sp	eed	RPM
INO	pise	

# **1.5 OSEC Plant**

# 1.5.1 Scope

The main scope of this activity is supply, install and commissioning of **An On Site Electrolytic Chlorination (Osec) Plant and its associated equipment** at Thika Water & Sewerage Company Ltd's Water Treatment No. 2. The assignment is divided into 2 parts as follows:

• Supply, install and commission an OSEC Plant complete (including mechanical and electrical works) with all accessories; as proposed by the bidder

• Civil works (piping to the existing salt saturator 50m from the OSEC building) and ancillary items.

The components of the assignment are implementation of necessary investigations (options to connecting to existing plant), detailed design and installation of one unit of OSEC Plant. This will require detailed descriptions and 'As Built' drawings and all other necessary documents upon commissioning.

# **1.5.2 Specifications**

The On Site Electrolytic Chlorination (OSEC) plant is a system used to provide viable, efficient and safe chlorine for potable water disinfection.

An OSEC plant uses softened water and salt (Sodium Chloride) to produce Sodium Hypochlorite on site and on demand through the electrolysis of a brine solution. This is a convenient system because the sodium hypochlorite can be produced on site as and when it is needed. The hypochlorite is generated electrolytically from solution of brine and softened water by OSEC electro-chlorinator.

A typical OSEC plant generally has the following components:

a) WATER SOFTENER: to provide softened water to the brine equipment and electro chlorinator

b) SALT SATURATOR: to produce the concentrated brine solution used by the electro chlorinator

c) THE BRINE PUMP: for metering and pumping the brine from the saturator to the electro chlorinator

d) ELECTRO CHLORINATOR: which generates the Sodium hypochlorite solution

e) TRANSFORMER/RECTIFIER UNIT: which provides the low voltage/high current DC supply to the electro chlorinator to effect electrolysis

f) CONTROL UNIT: This controls the level of operation of the plant automatically depending on different operating parameters e.g. temperature

g) STORAGE TANKS: for storage of the sodium hypochlorite and allowing release of the hydrogen gas to the atmosphere

The OSEC system to be supplied shall be complete with all the components including installation and commission.

There is already an old system running. Inclusion of parts of the existing system shall be at the descretion of the Client during the award of the Contract.

The system to be supplied should have been on the market for a minimum period of two (2) years.

# 1.5.3 Water Softener

In an OSEC plant, the saturated brine and the dilution water which is used by the electrolysers to produce NaOCl solution must be as soft as possible (Maximum 25mg/liter of CaCO<sub>3</sub>) to eliminate the buildup of deposits on the electrolyser electrodes during electrolysis, as these deposits would seriously impair the efficiency of the OSEC unit. As such, the plant should include a water softener capable of producing water not exceeding 25mg/liter of CaCO<sub>3</sub>.

## 1.5.4 Size of Plant

a) The OSEC plant should be able to produce Sodium Hypochlorite adequate to meet the full capacity of the Client's Water Treatment Plant of 30 Mega liters a day.

b) The minimum demand of Sodium Hypochlorite per day is 285 kg/day.

c) This means that components like the brine pump should have adequate capacity to pump enough brine solution from the saturator to meet this chlorine demand. This also means the OSEC electrolysers should be capable of generating a minimum of 285 kg/day of Sodium Hypochlorite.

## **1.5.5 Transformer/Rectifier Unit and Control Panel**

The supplier shall describe and specify the kind of transformer and rectifier that shall be used for powering the OSEC electrolysers to the satisfaction of the client. Further to this, details should be given for the device that shall be used for the automatic control of the operation of OSEC plant.

## **1.5.6 Salt Specifications**

The OSEC plant should be able to conform to the salt that is currently used by Thika Water & Sewerage Company Ltd. The salt has the following specifications:

- Maximum level of Water Insolubles of 0.1%
- Maximum level of Calcium Sulphate 0.14%
- Maximum level of Magnesium Sulphate 0.02%
- Maximum level of Magnesium Chloride 0.1%
- Minimum level of Sodium Chloride 99.82%

These specifications are for **Pure Vacuum Dried Salt**.

Alternatively the supplier should specify the kind of salt that shall be used for the OSEC plant that they are proposing to install. In case of the supplier proposing an OSEC plant that uses salt outside the specifications given above, the supplier should give an indication of the current cost of the salt per kilogram and where it can be sourced bearing in mind the geographical location of Kenya.

The equipment also has to be capable of handling any of salt outside these specifications but capable of producing the same quality of Sodium Hypochlorite.

## 1.5.7 Specification of Quality of Sodium Hypochlorite produced

The plant should be capable of producing a Sodium Hypochlorite solution concentration of between 0.8 to 1% concentrations.

#### **1.6 Construction Elements**

#### 1.6.1 General

A clearance of at least 2 meters shall be given to overhead structures to provide for unobstructed passage.

All equipment which is not embedded shall have lifting lugs, holes for eye bolts or have instructions for fixing of lifting belts for easy handling. Rotating machine parts shall be provided with solid covers. The covers shall be easy to remove for inspection.

#### 1.6.2 Bolts, Studs, Nuts, Screws, Washers

All bolts, studs, nuts etc. shall have a standard metric threading and conform to the relevant standards as regards shape and tolerance, and they shall be marked by manufacturer's symbol and class of strength.

Nuts and bolt-heads shall be hexagonal in shape and truly faced. Bolts and screws with sunk heads such as Hexagon Socket Head Cap Screws or Hexagon Socket Countersunk Head Cap Screws shall be hot dip galvanised only.

All bolts, studs, nuts, washers screws etc., above size M 16, shall be hot dip galvanised, except for bolts above Strength Class 8.8., for which corrosion resistant materials or electrolytic zinc-coating will be preferred. Bolts, etc., smaller than size M 16 shall be hot dip galvanised steel.

All bolts and nuts used in bolted and screwed joints in hydraulic steel structures shall have a minimum dimension of M 16.

Expansion bolts shall have a minimum dimension of M 16 and be in hot dip galvanised steel.

Bolts, nuts, studs and screws, which require frequent tightening and unbolting during inspection or maintenance procedures, shall be in hot dip galvanised steel.

## 1.6.3 Stairs, Ladders and Platforms

Generally all equipment shall conform to international accepted standards. Platforms and stairs shall be provided with slip resistant gratings or checker plates. All ladders and platforms in waterway (gate shaft etc.) shall be made from GRP. Stairs, ladders and platforms etc. may be manufactured in Aluminium, if the rigidity of the structures is duly considered.

## **1.7Instrumentation**

## **1.7.1 Field Instrumentation**

For design, construction and testing the applicable codes and standards as listed in this document shall be followed.

The instrumentation equipment must be suitable for continuous full load operation under the iven environmental conditions.

# 1.7.1.1 General Design and construction criteria General

In general, all field instruments must be suitable for open air operation, independent of the actual installation condition and location.

All instruments in a drinking water process must be suitable for drinking water application in compliance with the WHO Regulations.

In order to obtain a high reliability, long term and undistributed operation of the instrumentation, the following basic requirements must be observed:

- All instruments shall be of high quality industrial standard type.
- All instruments shall be solidly built using high quality components of the latest upto-date technology.
- Measuring errors and response time shall be as low as possible.

• All materials shall be selected to withstand for their life time the media and the environmental conditions that they will be exposed to.

All equipment and materials must be designed and selected accordingly, considering also the possible changes in the water analysis due to changed receiving conditions.

#### Instrument Measuring Units

In general, the metric system (SI-system) shall be used for all purposes. The following measuring units shall be used for calculations as well as for indication of instrument scales, controllers and read out units:

Temperature	oC (degrees
	centigrade)
Static	
pressure bar	
Absolute	bar (a)
pressure	
Differential	bar, mbar
pressure	
Level	m, mm
Flow	m³/hr, l/sec
Velocity	m/s
Vibration	mm/s
Hydrogen	ionactivity pH
Conductivity	μS/cm
Chloride	mg/l (ppm
Turbidity	NTU

## Accuracy Requirements

The instruments shall guarantee the accuracy features being specified in this section. Accuracy will be expressed in percent of adjusted span as far as not specified in percent of the measured value.

The given %-values contain the whole instrument loop including power supply units up to the output signal to the control system.

## **1.8Plant and Equipment Identification**

The Contractor shall prepare comprehensive plant identification schedules showing the name and number of each item of plant and its respective arrangement drawing number and add any additional items necessary to fully identify the plant which are subject to works under this contract. The identification and numbering of equipment, systems, items etc. provided, as well as all documents and drawings, shall be in accordance with existing numbering and the Engineer's instructions. In other words, all important parts of plant and equipment must be described to such an extent, that an identification by the operating staff (not only specialists) would be easy possible. The Contractor shall supply all labels, nameplates, instruction and warning plates necessary for the identification and safe operation of the plant and all inscriptions shall be in English. All labels, nameplates, instruction and warning plates shall be securely fixed, all appropriate items of plant and equipment with stainless steel or aluminium rivets, plated self-tapping screws or other approved means. The use of adhesives will not be permitted as well as the use of paper labels.

Outdoor nameplates, labels and instruction plates for plant and equipment identification and record purposes shall be manufactured from stainless steel or aluminium with a matt or satin finish and engraved with black capital lettering of a size which is legible from the working level.

Outdoor warning plates shall be manufactured from stainless steel with a matt or satin finish, engraved with red lettering and sited in a position which affords maximum personnel safety. Indoor labels, nameplates and instruction plate shall be manufactured from synthetic material (e.g. laminated rigid plastic labels) with the same substantial requirements as above mentioned. All equipment within panels and desks shall be individually identified by proper labels.

Each valve shall be fitted with a stainless steel nameplate with the number according to "Classification System for Plant and Equipment" indicating the valve schedules as approved by the Engineer. Where possible valve nameplates shall be circular and fitted under the handwheel captive nut. On check valves and small valves the Contractor may provide rectangular nameplates fitted to brackets on the valve or attached to a wall or steelwork in a convenient position adjacent to the valve.

# **1.9Pre-Service Cleaning and Protection of Plant And Equipment 1.9.1 General**

This clause covers mechanical and chemical pre-service cleaning and protection of the plant items and equipment that are not subsequently to be painted. Cleaning of fabricated component items shall be carried out after fabrication and final heat treatment or welding at manufacturer's works or at site, as appropriate. Mechanical cleaning as opposed to alternative chemical cleaning is the preferred method for works cleaning except where this is precluded by design or access considerations. Machined surfaces shall be protected during the cleaning operations. In the event of the surfaces not being cleaned to the Employer's satisfaction, such parts of the cleaning procedures or agreed alternatives as are deemed necessary to overcome the deficiencies shall be carried out at the Contractor's sole expense. For reclining small areas, hand cleaning by wire brushing may be permitted. Wire brushes used on austenitic materials shall have austenitic steel bristles. Austenitic stainless steels, copper and aluminium alloys, cast iron, bimetallic/plastic items and components fabricated by spot welding or riveting shall not be chemically cleaned. All weld areas shall be suitably stress relieved before chemical cleaning.

The date and place at which works cleaning will be carried out shall be notified to the Employer or its Consultant at lest six weeks in advance for witnessing and inspection. The Contractor shall take all responsibility for the treatment and disposal of waste according to the local law, in agreement and to the satisfaction of the Employer.

## **1.9.2 Mechanical Cleaning at Manufacturer's Works**

Mechanical cleaning shall preferably be carried out by abrasive blasting. The Employer is prepared to consider alternative methods provided they achieve the necessary surface condition.

Surface condition:

The metal surfaces shall be clean and free of mill scale, rust dirt, grease and any other deleterious matter. Where metal surfaces are to be painted, the surface profiles shall conform with the painting specification requirements. Where this does not apply surfaces shall have a surface text or not coarser than Grade 80 abrasive paper.

Abrasives:

Abrasives containing silica, silicates or slag residues shall not be used for water/steam side surfaces of plant except for cleaning sand castings, where hydro blasting with sand may be used.

## **1.9.3 Protection at Manufacturer's Works**

As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection, of sufficient quality to protect the materials and equipment for an extended period of time, in case of delayed dispatch or commissioning

All water, air and oil side surfaces shall be protected by the application of approved watersoluble corrosion inhibitors, or at site the plant shall be made available for inspection. In the event that the surfaces are not cleaned to the

Engineer's satisfaction such parts of the cleaning procedure or agreed alternatives as are deemed necessary to overcome the deficiencies shall be carried out at the Contractor's sole expense.
# 1.10 Ancillary Mechanical Equipment

# **1.10.1 Gear Reduction Units**

Units shall utilize bevel and helical gears and be designed to DIN standards, or other approved standard. Each reduction unit shall be designed to withstand all internal loading developed at the full load power of the motor (including motor starting torque up to 250% motor running torque), and the reverse torque produced upon stopping the prime mover together with any external loading produced by thrust, unbalance and vibration resulting from operating conditions.

Gears, pinions and shafting shall be made out of wrought and alloy steels. The gear teeth shall be hardened by a suitable method. All gears shall be manufactured to DIN or equivalent standards.

Housing shall be constructed of high-test grey cast iron to GG25 or fabricated mild steel and shall have adequate strength and rigidity to withstand all loads imposed by the operation of the equipment. Lifting lugs shall be provided.

All bearings incorporated in the gear reduction units shall be of the anti friction type having a life expectancy of 100,000 hours based on the relevant ASTM standard.

# 1.10.2 Lifting Gear

# 1.10.2.1 General

Lifting gear and associated equipment shall comply in general with relevant DIN standards.

The assembly shall be suitable for lifting the heaviest single item of equipment within the working area. The load hook, incorporating ball swivel joint, shall extend to within 1.0m of the lowest working level, whilst sufficient headroom shall be allowed below the crane hook to enable the tallest item of machinery to clear the motor floor level by 1.5m.

# 1.10.2.2 Runway beam hoist

Runway beams shall be supplied complete with all fixings, fish-plates, bolts and end stops.

# 1.10.2.3 Travelling Bridge Crane (general)

Flat bottomed crane rails to DIN standard shall be complete with all fixing bolds holding down bolts, fish-plates, end stops etc. The crane rails shall be supported on concrete or steel corbels. Allowance shall be made for expansion.

# **1.10.2.4 Travelling crane (hand operated)**

Travelling cranes and trolleys in general shall be of the single girder hand operated type. The crane shall have a geared cross travel, together with a suitable geared hoist, be fitted with an automatic braking arrangement and shall be capable of lifting the heaviest single item of the machinery within the working area.

#### **1.10.2.5** Travelling crane (electrically operated)

The long travel drive motors shall be totally enclosed type with extended shafts and adjustable torque type disc brakes. The drive motors shall be fed from adjustable characteristics solid state soft controllers designed for the required high start-frequency including inching.

The crane motions shall be controlled by a low voltage pendant push-button station suspended from a track section, utilizing a festooned flexible PVC insulated platform cable and allowing control from any point across the span independent of the hoist position. A strain wire shall be provided. Both the push-button and the crane structure shall be clearly marked to indicate the directions of travel.

#### 1.10.2.6 Davits

Davits shall be of the removable type complete with fixing socket and designed in general to DIN standards.

#### **1.10.3 Chemical Storage Tanks**

Prefabricated tanks for chemical storage shall be GRP, polypropylene as appropriate to the duty. GRP tanks shall comply to DIN standards. Hand lay-up chopped fibre construction will not normally be permitted. All necessary accessories such as ladders, rails, manholes, instrument connections de-aeration and filling pipe shall be included in the delivery. Emergency basin volume 1.0 x tank volume.

#### 1.10.4 Foundations

Surface pump units, blowers, aerators, etc. shall be placed on the floor, but should always have a raised footing (support) which will distribute the weight more evenly and avoid damage. Height min 100mm. The footing should be made of reinforced concrete and should form one part with the floor. After installing, the steel foundation/baseplate of the units have to be grouted, thickness 15-30mm.

- The design of the base-plate shall be such that:
- The stability of the equipment is guaranteed
- Vibrations do not occur
  - The units easily can be dismantled without removing the base-plates

Thread fasteners:

- Material: hot dip galvanized steel or stainless steel (in aggressive ambient)
- Anchor-bolts shall be placed in the concrete structure

For the purpose of leveling the machine no use shall be made of the anchor bolts; only set bolts shall be used

For grouting only a resin based mortar shall be used; use of cement mortar is not allowable. The grouting of the base-plates are included in this contract.

After the grout has cured the set-bolts shall be removed and the anchor-bolt shall be tightened

# 1.10.5 Pressuresed Air Vessel

Pressurized air vessel shall be designed, fabricated and tested in accordance with BS5500 and BS5169. It shall also comply with the Regulations in Kenya and shall be registered, as required by the Regulations.

The contractor shall submit the Test Certificate for the vessel to the Engineer. The working pressure of the vessel shall be not less than 1700kPa.

# 1.11 Construction Elements

# 1.12 General

A clearance of at least 2 meters shall be given to overhead structures to provide for unobstructed passage.

All equipment which is not embedded shall have lifting lugs, holes for eye bolts or have instructions for fixing of lifting belts for easy handling. Rotating machine parts shall be provided with solid covers. The covers shall be easy to remove for inspection.

# 1.12.1 Bolts, Studs, Nuts, Screws, Washers

All bolts, studs, nuts etc. shall have a standard metric threading and conform to the relevant standards as regards shape and tolerance, and they shall be marked by manufacturer's symbol and class of strength.

Nuts and bolt-heads shall be hexagonal in shape and truly faced. Bolts and screws with sunk heads such as Hexagon Socket Head Cap Screws or Hexagon Socket Countersunk Head Cap Screws shall be hop dip galvanized only.

All bolts, stud, nuts washers screws etc., above size M 16, shall be hot dip galvanized, except for bolts above Strength Class 8.8., for which corrosion resistant materials or electrolytic zinc-coating will be preferred.

Bolts, etc. smaller than size M16 shall be hot dip galvanized steel.

All bolts and nuts used in bolted and screwed joints in hydraulic steel structures shall have a minimum dimension of M16.

Expansion bolts shall have a minimum dimension of M16 and be in hot dip galvanized steel.

Bolts, nuts, stud, and screws, which require frequent tightening and unbolting during inspection or maintenance procedures, shall be in hop dip galvanized steel.

# 1.12.2 Stairs, Ladders and Platforms

Generally all equipment shall conform to international accepted standards. Platforms and stairs shall be provided with slip resistant gratings or checker plates. All ladders and platforms in waterway (gate shaft etc.) shall be made from GRP. Stairs, ladders and platforms etc. may be manufactured in Aluminium, if the rigidity of the structures is duly considered.

# **1.13** Instrumentation

# **1.13.1 Field Instrumentation**

For design, construction and testing the applicable codes and standards as listed in chapter 19.1.2 shall be followed.

The instrumentation equipment must be suitable for continuous full load operation under the given environmental conditions.

# 1.13.1.1 General Design and construction Criteria General

In general, all field instruments must be suitable for open air operation, independent of the actual installation condition and location.

All instruments in a drinking water process must be suitable for drinking water application in compliance with the WHO Regulations.

In order to obtain a high reliability, long term and undistributed operation of the instrumentation, the following basic requirements must be observed:

• All instruments shall be of high quality industrial standard type.

• All instruments shall be solidly built using high quality components of the latest up to date technology.

- Measuring errors and response time shall be as low as possible.
- All materials shall be selected to withstand for their life time the media and the environmental conditions that they will be exposed to.

All equipment and materials must be designed and selected accordingly, considering also the possible changes in the water analysis due to changed receiving conditions.

# Instrument measuring Units

In general, the metric system (SI-system) shall be used for all purposes. The following measuring units shall be used for calculations as well as for indication of instrument scales, controllers and read out units:

- <sup>o</sup>C (degrees centigrade) • Temperature
- Static pressure bar
- Absolute pressure bar (a)
- Differential Pressure bar, mbar
- Level m, mm
- m<sup>3</sup>/hr.l/sec • Flow
- Velocity m/s
- Vibration mm/s pН
- Hydrogen ionactivity
- Conductivity µS/cm
- Chloride mg/1(ppm)
- Turbidity NTU

#### **Accuracy Requirements**

The instruments shall guarantee the accuracy features being specified in this section. Accuracy will be expressed in percent of adjusted span as far as specified in percent of the measured value.

The given %-values contain the whole instrument loop including power supply units up to the output signal to the control system.

L L		% of spanned	%	of	measur
		% of spanned	%	of	measu

value

#### **TRANSMITTERS** (sensor, transmitter and converter)

•	Pressure	bar	±0.2
•	Diff. pressure	bar	±0.2
•	Flow (magnetic type)	m <sup>3</sup> /hr	±0.5
•	Flow (other types)		±1.0
•	Temperature	٥C	±0.5
•	Level	m(mm)	±1.0
•	Hydrogen-ionactivity	pH	±0.5
•	Conductivity	μS/cm	$\pm 1.0$
•	Chloride	mg/l	$\pm 1.0$

INDICATORS (at panels) General	Class 0.5	
<ul><li>SWITCHES</li><li>Pressure</li><li>Diff pressure</li><li>Level</li></ul>	±1.0 2% Hystersis ±1.0 for all ±1.0 switches	
Others     DIRECT TYPE INDICAT	±1.0 <b>`ORS</b>	
<ul> <li>Pressure</li> <li>Diff. pressure</li> <li>Flow</li> <li>Temperature</li> <li>Level</li> <li>Others</li> </ul>	bar m3/hr oC m (mm)	class 1.0 class 1.0 class 1.0 class 1.0 class 1.0 class 1.0 class 1,0

#### **Power Supply**

Power supply of the entire instrumentation equipment shall be 24V DC + 10% - 15% supplied from the station DC distribution of 230 V AV + 10% - 15% with separate power supply unit and battery back-up.

Contract rating for all switches and contacts shall be generally suitable for the connected equipment load including appropriate safety margin,

#### <u>Signals</u>

Output signals for analogue instruments shall be general provided with 4 - 20 mA potential separated without reference to ground.

Signal repeater and power units shall be inserted in the measurement loop as per requirement.

Measurement signal from the elements to the transmitters and power units at a different signal Level then 4 -20 mA shall be minimized and used only for

- Temperature measurement (sensors)
- Level measurement (sensors)
- Flow measurement (sensors)

- In any case, the signal input/output to/from station control shall be provided with 4 - 20 mA, burden resistance shall be preferable 0 to 750 Ohm if no higher values are required.

#### **Process Connection and Installation**

In general, stainless steel materials shall be used for all parts of the instruments exposed to the process water. This includes all sensors, tubes, fittings, connectors, valves, etc.

Process connections shall depend on the instrument, either metric or NPT threaded taps or ANSI flanges shall be used, suitable for the required pressure class. For process piping connection flare less tube fittings only shall be used.

Electric cable connections shall be provided with suitable sized stainless still cable glands (pg type acc. To DIN or equivalent).

Instruments installed in outside and open areas or in exposed locations shall be installed in suitable instrument boxes or cabinets with opaque window covers. Such instrument cabinets/boxes must be provided with anti-condensate heaters. For further details see "installation and Hook-up of Field Instrumentation".

#### Grounding

Potential equalizing cable and/or any other recommended and required grounding rings to guarantee proper and trouble free operation of the measuring units must be defined and supplied by the manufacturer, depending on the actual installation conditions.

#### **Hazardous Locations**

For all instruments installed in hazardous locations the respective explosion protection requirements must be fulfilled. Preferably equipment with the intrinsic safety class (EExi) with safety barriers or other approved electronic safety circuit separators shall be installed in the control room/instrumentation cabinets.

#### **Instrument Identification**

All instruments and associated equipment shall be provided with identification label containing the TAG No. of the instrument as per the respective P & I - diagram.

#### **1.13.1.2 Instrument Characteristics**

The following Chapter describes the main characteristics of the different instruments.

#### **Flow Measurement**

Flow meters shall be selected as per the specific system requirements. Preferably the following types shall be used only:

- Magnetic type
- Ultrasonic type
- Rotameter (also refered to as Woltman) type

The internal bore lining and the electrodes shall be of the field replaceable type. The internal bore shall be lined with hard rubber, PTFE or neoprene, and the electrodes shall be stainless steel or approved equal, depending on media. Measure range according to measure point.

Flow/level Measurement with ultrasonic transmitter, The accuracy of the measurements shall be  $\pm 3\%$  of actual flow.

#### **Flow Signal Converter**

The flow signal converter shall be either primary head mounted or separated with file casing for wall mounting.

Distance between the primary head and the separated signal converter shall be possible u to 20m. The cable type shall be specified by the flow meter manufacturer depending on the actual installation conditions.

The signal converter shall be micro processor based including all necessary features for monitoring and control of the flow meter units, with analogue signal output for flow value and scalable frequency output for tatalised flow.

In addition the following auxiliary output options shall be available

- Reverse flow detection
- Zero flow detection
- Low flow cut-off
- Status signals, adjustable

Flow Switches

Mechanical or electrical operated insertion types shall be used.

Depending on location a threaded or a flanged connection might be foreseen. All part of flow switches which come into contact with water should be of high corrosion resistant stainless steel material.

Pressure Measurement

Manometer

100mm

Generally, Bourdon type pressure gauges filled with flui shall be used. Design in compliance with operational safety requirements of DIN 16006.

Differential pressure manometers shall be of Bourdon cell type and also liquid filled.

Nominal size; 160mm for main process system

for utility and auxiliary systems

All parts which are in contact with the water shall be selected as per the specified requirements; stainless s steel materials shall be used only. The manometer shall be provided with overpressure protection.

Required accuracy: class 1.0

Manometer with Contacts

Pressure indicators (manometers) with integrated magnetic spring contacts shall be used for pressure switch application.

Depending on the requirement either single or double contact systems shall be used. Set point adjustment from the outside by adjusting red pointer(s).

Contacts(s) rating shall be as specifications above.

Pressure Switches

Pressure switches with integrated SPD contacts shall be used.

Set point adjustment shall be possible depending on the selected characteristic, either low or high function.

Contact(s) rating shall be as per item specifications above.

Pressure Transmitter

Transmitters with well proven pressure measuring elements of the latest up-to-date technology only shall be used. Smart series is preferred.

2-wire-DC transmission with no need of a separate field power supply shall be used. High over range protection and easy access for zero and span adjustment is required. The instrument body and all parts being in contact with the water must be of corrosion resistant material, at least CrNi-steel shall be used for the body and the process connection part.

Required accuracy: better than±0.2% of span

(including effects of hysteresis, repeatability and linearity.)

#### **Differential Pressure**

Manometers and transmitters for differential pressure shall be in principal in conformity with the requirements of above specifications

#### **Measurement of Temperature**

Temperature Indicator

Dial or tube thermometers with quick response time may be used for local indication Depending on application, either directly mounted thermometers or capillary type thermometers shall be used, In general, suitable thermo-wells shall be provided. Required accuracy: Class 1.0

Temperature Elements/Transmitters

Temperature elements for remote indication shall be of high repeatable and stable resistance type sensors with quick response time, preferably Pt 100 elements.

With the exception of special application inside machines or equipment, the temperature elements shall be generally installed in suitable thermo-wells.

All temperature elements shall be wired from the sensor terminal head up to the temperature transmitter in 3 –wire connection. If the cable distance between the sensor head and the transmitter is more than 20 m, the wiring must be performed in 4-wire connection.

Thermo-wells and temperature element tubes shall be generally made of stainless steel, CrNi-material. Suitable thermal paste shall be filled into the thermo well before insertion of the temperature element in order to avoid air pockets.

The temperature transmitters shall be installed in instrument cabinets and shall be of fully electronic type with 3-wire of 4-wire Pt 100 input and 4 - 20 mA 2 –wire signal output. Power supply preferably 24 V DC.

#### Level Measurement

#### Ultrasonic level Transmitter

If not otherwise specified ultrasonic level transmitter/sensors shall be used for contactless level measurement.

The sensor shall be temperature compensated and shall be connected to the central unit by two-core cable.

The central unit shall be microprocessor based, fully programmable by incorporated function keys.

The central unit shall be installed in the control cabinet or control panel front side. The accuracy of the level measurement shall be in the range of  $\pm 2 - 5$ mm. Output for free adjustable level alarm contacts as well as analogues 4 - 20 mA signal and alarm relay output shall be provided on the central unit.

#### Hydrostatic Level Transmitter

Hydrostatic level transmitter/sensors shall convert the pressure of the liquid column into the level signal. Depending on the height of the reservoir or well the length of the probe and the connection to the sensor head must be selected. The pressure probe and the wall mounted supporting tube or rope shall be of high corrosion resistant material.

In case of pressurized vessels or tanks the pressure on top of the water level must be considered.

The electronic signal converters shall be wither installed in field boxes or in the instrumentation cabinets in the control room.

Output for free adjustable level alarm contacts as well as analogues 4 - 20mA signal and if required alarm relay output shall be foreseen.

#### Level Switches

Depending on location, float type or conductive sensing type, level switches shall be used. All parts of the level switches coming in contact with process fluid shall be of high corrosion resistant material. The monitoring electronic unit for the conductive sensing type shall be provided as close as possible to the sensing element or incorporated.

#### Vibration level switches

The vibrating fork and socket shall be of stainless steel and without movement parts and shall be free of wear and maintenance. The sensor shall not be connected to a supply of voltage higher than 24 V.

#### Float switches

The construction of their suspension structures shall facilitate the simple height adjustment of the float switches. The positions of the float switches shall be allocated in such a way that there is no possibility of the float being trapped or caught by other moving parts. The float switches shall not be connected to a supply of voltage higher than 24 V.

#### Other measuring systems

All necessary analogue and discreet measuring devices are part of the contract and shall be mounted according to the manufactures standard.

#### Auxilliary Plant Instruments

For all auxiliary systems and plants all required instrumentation equipment shall be provided. Instrument characteristics shall be selected by the plant manufacturer in order to guarantee good and safe operation and performance of the system/plant. As far as applicable instruments with the same main characteristics as described shall be used.

# **1.13.2 Instrumentation and Hook Up**

#### 1.13.2.1 General

This chapter describes the requirements for the design, manufacturing and installation of instrument hook-up material, including the installation, calibration and testing procedures of all field instrumentation and associated equipment.

#### 1.13.2.2 Standards and Codes

For the installation and testing of the instrumentation equipment the codes and standards as indicated in Specification.

#### **1.13.2.3 Design Requirements**

For the design, supply and installation of all field instrumentation hook-up material the maximum possible uniformity and interchange ability shall be considered in order to minimize different spare parts.

This specification will be also valid for the applicable instruments of the utility systems.

The used materials for all equipment, process connection tubes, fittings, valves and mounting supports shall be selected to withstand the water and the environmental conditions for the life-time of the instruments without corrosion and any negative effect.

In general, stainless steel or other suitable non corrosive materials shall be used for all equipment and components contacting the water.

# 1.13.2.4 Installation

# **General Requirements**

The Contractor shall execute the installation. Calibration and the testing works for all field instruments in compliance with the scope of contract, including all associated equipment and works.

As far as possible the instruments shall be provided as pre-fabricated, work-shop tested and calibrated package units.

#### **Process Connections**

Generally all connections shall comply with the mechanical and piping requirements and as required by the equipment manufacturers.

Process connections on underground pipes shall be carried out in shafts with suitable space and access covers.

Process connections shall be at least  $\frac{1}{2}$ "taps for pressure measuring. Type of connections shall depend on the instruments – either metric or NPT threads or ANSI flanges in accordance with the required pressure class.

For vendor packages and instrumentation at utility systems the approved manufacturer standard practice shall be applied.

Each instrument shall have its own main process connection, except the combination of transmitter, switches and gauge.

Each instrument shall have its own isolating 3-way valve including the appropriate test connections for calibration and testing of transmitter, gauge or switch.

Each instrument or instrument combinations shall have vent connections either separate or integrated in the instrument isolating valves.

All manometers shall be equipped with shock absorbers.

#### Local Instrument Cabinets (if applicable)

Instruments installed outside in open areas or at other exposed locations shall be mounted in suitable instrument boxes or cabinets. These cabinets shall be of high quality, resistant against corrosion and weather, consisting preferably of glass-fibre reinforced polyseter resin.

Each cabinet shall be equipped with a thermostatically controlled electric heater in order to be protected against condensation. Electrical power

supply with 230V, 50 Hz from the instrument cabinet in the control room shall be provided.

Generally the cabinets shall have front access doors with observation windows. The front doors shall be designed sufficiently large enough to enable routine maintenance and the removal of instruments without dismantling other equipment.

Inside the cabinets mounting rails with C-profile or equivalent shall be provided, which allows fixing of the instruments and isolating valves. All instrument manifold valves shall be located inside the boxes.

A large number of different sizes of cabinets should be avoided and standard boxes shall be preferred.

The whole hardware needed for mounting and fixing, such as C-profiles, bolts, nuts, washers, screws, etc shall be of stainless steel material. Instruments and hook-up materials within the instrument boxes shall be completely factory

assembled or at least pre-mounted and pre-tested before installation on site.

All process line entries shall be provided with watertight seals. All electrical cable entries shall be carried out by suitable cable glands.

The instrument boxes shall be mounted directly on walls or on separate free-standing and stable galvanized steel supports.

#### **Instrument Location**

Instruments shall be mounted in such a position as to guarantee the specified accuracy of measurement, easy access for maintenance3, good visibility of indicating instruments and standardization of installation.

All instruments and associated equipment shall be mounted at such an elevation from the ground or service platform that no scaffolding is necessary for routine inspection and maintenance.

If not specified otherwise, instruments shall be mounted about 1.6m above the level of the operating platform or finished floor level of the building.

#### **Specific Installation Requirements**

All specifications, recommendations and mounting instruction of the instrument manufacturer must be considered in addition to the requirement listed here.

Flow Meters

Generally, all flow meters are located in underground shafts or in pump houses or reservoir chambers.

In all cases the installation of the flow elements shall be in accordance with the pressure class of the connected pipe work.

The power supply unit for the flow meter, incorporating the signal converter shall be either wall-mounted, direct sensor mounted or mounted in the control cabinet.

Grounding of the flow element is to be carried out by grounding rings at each end of the measuring tube. In addition, each flange of the connecting pipe must be equipped with a special grounding connection and shall be connected together with the earth strips of the metering tube to the common station grounding system. A grounding bus bar is to be provided in each flow meter shaft.

The cabling between the sensing elements and the transmitter (if separated) shall be carried out with special shielded cables, which are part of supply of the flow element. The prefabricated cables shall not be cut; excessive lengths shall be secured in a cable ring close to the flow element.

The flow meters shall be flanged. If necessary due to hydraulics in system pipe shall have shut off valve(s), gate valve type, on each side of the meter. Magnetic flow meters exceeding DN300 shall be equipped with dismantling joints. A replacement pipe section shall be stored for each dimension.

#### **Measurement of Pressure**

Generally, process connections shall be  $\frac{1}{2}$ "-taps and include a block valve as part of the piping erection. For utility systems either 1" or  $\frac{3}{4}$ " –taps shall be used also with a block valve.

Each pressure measuring instrument as well as local indicators, pressure transmitters, pressure switches or indicators with contact shall have their own isolating valve (3-way-manifold valve) and shall be equipped with appropriate test connections for calibration.

For delta P instruments block valve combination or a 5-way multi block manifold valve shall be positioned directly at the pressure instrument connections. It shall also be equipped with a test connection and it shall be possible to shut off the test connection without isolating the service pressure for the instrument.

Each instrument or instrument combinations shall have separate vent piping with valve.

The dimension of the pressure piping shall be either  $\frac{1}{2}$ " or 12mm. If pulsating pressure is to be assumed, generally pulsating dampers shall be installed. In case of possible vibrations special compensation loops shall be foreseen.

# **Continuous Measurement of Level**

In general, all level measurements in tanks, reservoirs or structures shall be carried out by using level transmitters based on the ultrasonic or the delta-p measuring principle. The sensors shall be situated in such a position that maintenance works and calibration can be carried out safe and easily. The sensors shall be installed close to the access openings.

## Level Switches

Fixed installed level switches, operating on the capacitive principle or float type switches shall be provided accessible near and maintenance star/ladder.

# 1.13.2.5 Checking and Test in Completion General

All checking and testing works during the final stage of construction of installations as well as during start-up and tests on completion have to be performed carefully and in accordance with the manufacturer's instructions.

#### **Checking during Erection**

The following checks shall be carried out continuously during the entire erection and installation period:

- Conformity of the works with the approved drawings, specifications and standards
- Proper execution of the works, especially protection of equipment during construction period
- The corrosion preventive paintings of all parts not accessible after installation.

#### **Test on Completion of Installation**

After completion of the installation works, tightness tests and pressure tests shall be performed by the Contractor. The object of these tests is to ensure that there are no leaks of threads, flanges or unions on piping connections and/or instruments.

The pressure tests shall be carried out at the design pressure of the instruments. The instruments shall be drained carefully after tests.

All these tests shall be recorded in lists containing the test pressure, the TAG number and the date of test and shall be signed by the responsible test engineer.

All possible precautions shall be made to avoid deterioration of the whole equipment during the test procedures.

#### **Temporary Installation**

Some instruments (control valves, flow meters) may be mounted temporarily to permit tie-ins of the instrument connections and the further pipe work. In

this case the equipment must be dismounted and protected during flushing and hydrostatic tests of the process piping system.

If necessary, such items shall be replaced by special spool pieces to permit the flushing and pressure testing of the piping without damaging the instrument equipment.

#### **Protection during Painting**

It is Contractor's responsibility to protect all the instrumentation during the site sand-blasting and painting of the associated station piping system.

In order to avoid destroying or damaging all instruments shall be dismounted or suitable covered.

Dismounted process connections have to be closed carefully to prevent entering of dust or paint.

Rating plates and labels shall be carefully covered if the equipment is not dismounted.

# 1.13.2.6 Calibration General

Generally, all calibration and pre-settings shall be performed as far as possible either at the manufacturer's workshop or laboratories independently from the assembling operations. Pre-setting and re-calibration on site shall be performed after final installation of instruments. The instruments are to be kept sealed after calibration.

All apparatus necessary for a good quality calibration must have a higher precision than the instruments being calibrated and must be provided by the Contractor. A check-out sheet shall be prepared for each instrument, containing TAG-number, the service, the type and characteristics of each instrument or element, the measuring range and limit values as well as the calibration results.

The instrument car shall carry also the following items:

- Date of inspection/calibration
- Name and legible signature of the person who performed the inspection/calibration
- Remarks on the detected defects, if any

- The register shall have two spaces for date and signature beside each item. Defective instruments must be returned to the manufacturer and are to be replaced by new instruments.

# Local Adjustment

All instrumentation equipment, such as primary elements, transmitters, as well as panel mounted instrumentation, for the plants of the entire pipeline shall be finally adjusted on site with the most suitable apparatus, at least involving the following procedures:

- Zero and span adjustments for mechanically operated equipment (i.e. level gauging)

- Zero and span adjustment for transmitter with checking of intermediate valves at 0 - 25 - 50 - 75 - 100% of the span

In particular, the zero output signals sent to the control rooms shall never be less than the normal operating output.

In case of small deviation, a value above zero is preferred.

- Set point adjustment of all switches or alarms with accuracy control in increase and decrease, with three consecutive variations from minimum to maximum span of the switches. The set point absolute value must not deviate for more than 1% of the adjusted value after these variations.

- Checking of the polarities and voltage at terminals of each electrical or electronic instrument.

- Calibration of temperature instruments by use of calibrated test thermometers and thermostatic bath.

- Calibration of the receivers, recorders, controllers and indicators by means of calibrated precision current, voltage and resistance generators/bridges.

- Checking of all electrical circuits related to their primary elements, as transmitters, receivers, indicators, control and regulating valves

- Checking of the alarm and safety circuits.

Generally, the final testing and calibration shall be carried out by qualified instrument specialists and/or test engineers only.

# 1.14 Plant and Equipment Identification

The contractor shall prepare comprehensive plant identification schedules showing the name and number of each item of plant and its respective arrangement drawing number and add any additional items necessary to fully identify the plant which are subject to works under this contract. The identification and numbering of equipment, systems, items etc. provided, as well as all documents and drawings, shall be in accordance with existing numbering and the Engineer's instructions. In other works, all important parts of plant and equipment must be described to such an extent, that an identification by the operating staff (not only specialists) would be easy possible. The Contractor shall supply all labels, nameplates, instructions and warning plates necessary for the identification and safe operation of the plant and all inscriptions shall be in English. All labels, nameplates. Instruction and warning plates shall be securely fixed, all appropriate items of plant and equipment with stainless steel or aluminium with a matt or satin finish and engraved with black capital lettering of a size which is legible from the working level.

Outdoor warning plates shall be manufactured from stainless steel with a matt or satin finish, engraved with red lettering and sited in a position which affords maximum personnel safety.

Indoor labels, nameplates and instruction plate shall be manufactured from synthetic material (e.g laminated rigid plastic labels) with the same substantial requirements as above mentioned. All equipment within panels and desks shall be individually identified by proper labels.

Each valve shall be fitted with a stainless steel nameplate with the number according to "Classification System for Plant and Equipment" indicating the valve schedules as approved by the Engineer.

Where possible valve nameplates shall be circular and fitted under the handwheel captive nut. On check valves and s mall valves the Contractor may provide rectangular nameplates fitted to brackets on the valve or attached to a wall or steelwork in a convenient position adjacent to the valve.

# **1.15 Pre-Service Cleaning and Protection of Plant and Equipment**

# 1.16 General

This clause covers mechanical and chemical pre-service cleaning and protection of the plant items and equipment that are not subsequently to be painted.

Cleaning of fabricated component items shall be carried out after fabrication and final heat treatment or welding at manufacturer's works or at site, as appropriate.

Mechanical cleaning as opposed to alternative chemical cleaning is the preferred method for works cleaning except where this is precluded by design or access considerations.

Machined surfaces shall be protected during the cleaning operations.

In the event of the surfaces not being cleaned to the Employer's satisfaction, such parts of the cleaning procedures or agreed alternatives as are deemed necessary to overcome the deficiencies shall be carried out at the Contractor's sole expense.

For reclining small areas, hand cleaning by wire brushing may be permitted. Wire brushes used on austenitic materials shall have austenitic steel bristles. Austenitic stainless steels, copper and aluminimum alloys, cash iron, bimetallic/plastic items and components fabricated by spot welding or reverting shall not be chemically cleaned. All weld areas shall be suitable stress relieved before chemical cleaning.

The date and place at which works cleaning will be carried out shall be notified to the Employer or its Consultant at least six weeks in advance for witnessing and inspection.

The Contractor shall take all responsibility for the treatment and disposal of waste according to the law, in agreement and to the satisfaction of the Employer.

## **1.16.1 Mechanical Cleaning at Manufacturer's Works**

Mechanical cleaning shall preferably be carried out by abrasive blasting. The Employer is prepared to consider alternative methods provided they achieve the necessary surface condition.

#### **Surface Condition:**

The metal surfaces shall be clean and free of mill scale, rust dirt, grease and any other deleterious matter.

Where metal surfaces are to be painted, the surface profiles shall conform with the painting specification requirements.

Where this does not apply surfaces shall have a surface text or not coarser than Grade 80 abrasive paper.

Abrasives:

Abrasives containing silica, silicates or slag residues shall not be used for water/steam side surfaces of plant except for cleaning sand castings, where hydro blasting with sand may be used.

#### **1.16.2 Protection at Manufacturer's Works**

As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection, of sufficient quality to protect the materials and equipment for an extended period of time, in case of delayed dispatch or commissioning.

All water, air and oil side surfaces shall be protected by the application of approved water soluble corrosion inhibitors, or at site the plant shall be made available for inspection. In the event that the surfaces are not cleaned to the Engineer's satisfaction such parts of the cleaning procedure or agreed alternative as are deemed necessary to overcome the deficiencies shall be carried out at the Contractor's sole expense.

# 1.17 Signs

#### 1.17.1 General

Safety colours, safety symbols and safety signs must comply in construction, geometrical form, colour and meaning with the ISO Recommendation 507 of the ISO committee TC 80 "Safety Colours".

Signs of plant identification during the erection period are subject to the Engineer's approval.

The signs shall be of a material which is weather-resistant and has sufficient longevity under the conditions prevailing on site.

The position for the signs must be chosen so that they are within the field of vision of the persons to whom they apply. The signs shall be permanently attached. Temporarily dangerous areas (e.g construction) sites, assembly areas) may also be marked by portable signs. The safety signs must be mounted or installed in such a manner that there is no possibility of misunderstanding.

All sites subject to any rehabilitation and renewal works shall be proper equipped with signs as specified under this clause.

# **1.17.2 Information Signs**

Information signs shall supply the necessary information to acquaint personnel with the physical arrangement and structure of site, buildings and equipment.

For example:

Floor numbers, load-carrying capacities including marking of floor areas, working loads of cranes, lifting gear and lifts, room identification, etc.

In the choice of information signs for applications where nothing is specified by ISO Recommendation 507 the possibility of using pictograms shall be considered.

Pictograms are particularly suitable for the identification of rooms, area and buildings in the non-technical areas of the plant, sanitary and amenities buildings, etc.

#### **1.17.3 Signs for Emergencies**

In the event of accidents, all necessary information should be available immediately to those affected. Therefore a sufficient number of signs of appropriate size shall be installed such as, for example:

Escape routes (including marking of floor areas), emergency exists, fire alarms, fire extinguishers, instructions for special fire extinguishing agents, warnings against fire-extinguishing agents (CO<sub>2</sub>), first aid points, accident-reporting points, telephones, etc.

#### **1.17.4 Signs to be Obeyed**

Signs to be obeyed must be installed wherever certain action is necessary, for example:

Do not obstruct entrance, keep right, etc.

Signs be obeyed should also indicate when the wearing of protective clothing and equipment as necessary, for example:

Protective goggles, protective clothing, helmets, head guards, breathing equipment, ear muffs, etc.

# 1.17.5 Warnings Signs

Warning signs should refer to the existence or possible existence of danger, such as: Inflammable substances, explosive substances, corrosive or noxious substances, suspended loads, general danger, width/height restriction, danger or trapping, steps, slipping, falling, etc.

In addition to warning signs, appropriate black and yellow stripe markings shall also be used where necessary.

# **1.17.6 Prohibition Signs**

Prohibition signs are as follows, for example;

No smoking: no fires: no naked lights or smoking; no entry to pedestrians; use no water; no entry; do not start; etc.

# **1.18** Fire Protection Equipment

In each pumping station and buildings of the various treatment works CO<sub>2</sub> gas fire extinguishers shall be provided. The portable fire fighting equipment shall be in accordance with codes of practices, BS 5306, BS 7863 and BS EN 3.

The equipment shall be portable and have a minimum of 5kg capacity. It shall be of rechargeable metal body type.

If not otherwise specified in the particular specifications or the BoQ, 2 no.

fire extinguisher shall be provided in each building.

The fire extinguishers shall be mounted on the wall with brackets where directed by the Engineer. The location shall be indicated with proper signs above the units.

The units shall be simple to operate with controllable discharge and shall e fitted with rotary non-conductive and anti-static distributor horns.

# 2 GENERAL ELECTRICAL REQUIREMENTS

# 2.1General

# 2.1.1 Field of application

General specifications apply to supply, installation and operation of particular electrical and mechanical devices and systems, including detail design-especially the electrical single line diagrams-, software, documentation, spare parts and all associated items to be delivered within the frame of this contract.

The work under this contract involves the provision of all labour, materials and equipment required for the installation, testing and commissioning of complete and functioning system as specified herein and any other items of plant, equipment or materials required to form a complete installation.

The general Specifications are an integral part of he Contract Documents, and shall be read accordingly, comply with the requirements of the Conditions of contract and general Requirements.

# **2.1.2 Relation to other Sections**

This Section includes specifications for products, common criteria and characteristics and methods of execution that are common to one or more Sections of the Electrical Division, and it is intended as a supplement to the required unit of work of each section and shall be read accordingly.

# **2.1.3 Uniformity of Products**

Coordinate with the sections of this Division and other Divisions of the Specification to supply products of the same manufacturer when these products have similar functions and characteristics. When the same manufacturer cannot be used by all sections for a similar product, and the product is installed in finished areas, the products shall be similar in style and finish as directed by the Specification.

Following are examples of products which should be coordinated with other sections:

- High and low voltage energy and control cables
- Lighting
- Switches and sockets
- Products with special surface treatment or finish and colour
- Motor starters, soft starter and frequency inverter
- Disconnect switches and circuit breaker
- Contactors
- Control and protection relays
- Programmable control relays
- Analogue and digital instrumens

- Command equipment installed in switchboards
- •

# 2.1.4 Quality of Products

Manufactured products supplied and installed under Work of Section of this Division shall be new, the best of their respective kind available on the international market, free of all defects, and in accordance with Contract Documents.

Fabricated products shall be assembled from new materials, and in accordance with Contract Documents. All products to be located in non-air-conditioned areas shall be approved for use in  $50^{\circ}$ C ambient and 100% R.H. non condensing unless specified otherwise, including sunshine effect where exposed outdoors.

# 2.1.5 Qualifications of manufacturers

Products specified in this Division shall be manufactured by manufacturers regularly in the production of the specified product.

# 2.1.6 References

All products shall be in accordance with Section "*standards and approvals for electrical installations and equipment*" as well as to other governing bodies acceptable to the local Authorities.

# 2.1.7 Test reports and acceptance procedures

Submit product factory test reports when requested for review a minimum of four weeks prior to installation of the product.

Inform the Consultant latest fourteen days prior to a product factory test being performed. The Engineer shall be given the opportunity to witness the rests as his discretion.

Submit to the Consultant copies of Inspection and Completion Certificates as prescribed in the applicable Regulations of the IEE and responsible Electrical Authority.

Apply for, obtain and pay for all permits, licences, inspections, examinations and fees required.

Before starting any work, submit the required number of copies of drawings and specifications to the Authorities for their approval and comments. Comply with any changes requested as part of the contract at no cost to the Client, but notify the consultant immediately of such changes, for proper processing of these requirements. Prepare and furnish any additional drawings, details or information as may be required.

20.1.8 Letters of Satisfaction

Submit originals of letters from the manufacturers of products listed, indicating that their technical representatives have inspected and tested their

respective products and are satisfied with the methods of installation, connection and operation.

These letters shall state the names of person present at time of testing, the methods used, a list of functions performed and the location and room number where applicable. Submit such letters for equipment as specified in the Particular Specifications, but in principle for:

- High/medium voltage switchgears
- Low voltage switchboards and sub-panels
- Pump motors
- Pumps
- Circuit breaker
- Soft starter
- Frequency inverter
- Standby generator
- Transformer

# 2.1.8 Instructions to Client`s/Employer`s staff

Instruct the Client's representatives in all respects of the operation and maintenance of system and equipment, listed in the relevant Sections of Particular Specification. Obtain in writing from the Consultant a list of the Client's Representative qualified to receive instructions.

Arrange and pay for services or service engineers and other manufacturer's representatives required for instruction on specialized portions of installation.

#### **2.2Standards and Approvals for Electrical Installation and Equipment 2.2.1 General**

In general great importance is attached to accurate execution of works so that the installation permanently withstands the environmental stress and that reliable function is guaranteed.

It is under the responsibility of the contractor to ensure that all electrical and mechanical devices are constructed in accordance with the pertinent specifications and that import, installation and operation is permitted. The contractor is responsible for any kind of legal obligation to obtain official approval.

# 2.2.2 Standards and approvals

The design, the contractor's documents, the execution and the completed works shall comply with the country's technical standards, building, construction and environmental laws, laws applicable to the product being produced from the works, and other standards specified in the employer's requirements, applicable to the works, or defined by the applicable laws.

In general all electrical and mechanical devices and installations shall conform not only to effective national standards and approvals but also to the Harmonized European Standards (IEC/EN). The devices must be marked accordingly. It concerns such as installations, operation, installation materials, methods and specific climatic and safety conditions as well as electric devices such as low and high voltage switchgear, switchgear assemblies, motors, cables, transformer, softstarter, relays, frequency inverter, panels, earthing, lightning protection devices, etc.

To reach the specified requirements concerning quality, function, safety, reliability, compatibility and Employer's requirements, electrical equipment and installations shall comply with the Harmonized European Standards(IEC/EN is not appropriate or not sufficient. The devices must be marked accordingly.

All electrical devices to be provided shall also conform to the European low-voltage directive and must be provided with a CE-mark (Conformite' Europe'en). Other standards approved to be equal to have to be accepted by the Client. The bidder is obliged to point out variances.

All electrical devices and installations to be provided must comply with the Electromagnetic Compatibility (EMC) Directive.

The technical instructions of National and Local Electricity Authorities) power utilities) shall be considered. Special attention shall be paid to the connections to the public grid. Selection of material and devices as well as the dimensioning and construction of the grid connections shall correspond to the instruction of the power utility as well as to relevant IEC/EN standards and instructions given by manufacturers. All relevant installations shall be clarified in co-operation with the power utility; their written authorization shall be obtained before devices are delivered and before construction works start.

If appropriate technical instructions of the power utilities are not available or not sufficient to reach the specified requirements concerning quality, function, safety, reliability, compatibility and Employer's requirements, electrical equipment and installations shall comply with the Harmonized European Standards (IEC/EN) and not least with DIN VDE (German Industrial Standards), if IEC/EN is not appropriate or not sufficient. The devices must be marked accordingly.

Regulations and instructions of the relevant power utility for putting devices and plants in operation shall be observed. If not specified differently, the Contractor is in general responsible for relevant applications and permissions.

#### 2.2.3 Circuit documents

Provided circuit documents of all types, tables, diagrams and descriptions are to be in accordance with IEC 113-1.

Circuit documents are to be supplied for the complete electrical system being supplied. They have to explain the function of circuits or power connections and provide information for the construction, installation and maintenance of the electrical installations. All diagrams show the voltage-free or current-free status of the electrical installation.

#### 2.2.4 Marking of electrical equipment

All marking, including code letters for type of equipment and for general functions shall be to IEC 750.

The marking appears in an appropriate positions as close as possible to the circuit symbol. The marking forms the connection between the equipments in the installation and the various circuit documents (diagrams, part lists, circuit diagrams, instructions).

#### **2.2.5 Protective measures**

Selection of appropriate protection against shock currents shall be to IEC 364-4-41. It includes protection against direct and indirect contact.

The Protective device must automatically disconnect the faulty part of the installation. At no point of the installation may there be a touch voltage or an effective duration larger than permitted to IEC standard. The internationally agreed limit voltage with a maximum disconnection time 5 seconds is 50V a.c. or 120V d.c. Selection of type of system shall be to IEC 364-3 (e.g. TN-system, TT-system, and IT- system.

#### **2.2.6 Overcurrent Protection of Cables and Conductors**

Wiring and cables must be protected by means of overcurrent protective devices against excessively high temperature rises, which can result from operational overloading as well as short circuits.

#### 2.2.7 Arrangement of Protective Devices for Short-Circuit Protection

Protective devices for short-circuit protection must be fitted at the start of every circuit, as well as at every point at which the current-carrying capacity is reduced, if a protective device connected upstream cannot ensure the required protection.

#### 2.2.8 Protection of the Phase Conductors

Overcurrent protective devices must be provided in all phase conductors. They must cause disconnection of the conductor in which the overcurrent occurs, but not necessarily disconnection of the other live conductors. If the

disconnections of an individual phase conductor could cause danger, suitable precautions have to be taken.

Already in the detail design phase the proof has to be given, that all protective measures are in accordance with the above given conditions and standards.

#### 2.2.9 Protective In The Event Of A Power Failure

Design of equipment and protection functions must be in accordance with IEC204-1 individual machines or parts thereof are only allowed to restart automatically on return of the voltage after a supply failure, if no danger can be caused to persons or the machine. Additionally the plant must be switched to automatic mode of operation.

# **2.2.10 Protection in the event of a fault**

External influences or the failure of components can cause unwanted operation of the electrical equipment or a machine. As this might result in the safety circuits being rendered ineffective, appropriate measures, such as additional safety circuits and redundancy connected downsteam, should be taken to prevent any possible dangers arising.

#### 2.2.11 Wiring

The minimum cross-section for single core and multi-core copper conductors inside control panels is 1.0mm<sup>2</sup>.

Cables which are not laid in ducts must be adequately supported. Control circuits should be laid in separate ducts res. In case one common duct is used, they should be separated from power cables by separating strips.

# 2.2.12 Technical standard of control circuit devices

All control circuit devices used for flush mounting, surface mounting or rear mounting in switchboard panels or insulated enclosures must be in accordance with IEC/EN 60 947. The function is guaranteed for an ambient temperature of Min/Max.  $-25/+40^{\circ}$ C. The rated insulation voltage is 500V. The climatic proofing must be in accordance with damp heat, constant, IEC

60 068-2-3 and damp heat, cyclic, to IEC 60 068-2-30.

Required minimum degree of protection:

- For contact elements and lamp sockets; IP 20
- For switches, push button and key-operated actuators and indicator light:IP65

# a)Colour coding for Push-buttons

The colour coding must be in accordance with IEC 73.

colour	Meaning of colour	
red	Action in case of emergency	
	STOP OR OFF	
yellow	ow Intervention to suppress abnormal conditions or to avoid	
	unwanted changes	
Green	Start or On	
Blue	Any specific meaning not covered by the above colours	
White	No specific meaning assigned	

#### b) Colour coding for Indicator Lights

Colour	Meaning of Colour	
Red	Danger or Alarm, Warning of potential danger or a situation which requires immediate action	
Yellow	Caution; change or impending change of conditions	
Green	Safety; Indication of a safe situation or authorization to protect, clear way	
Blue	Specific meaning assigned according to the need in the case considered	
White	No specific meaning assigned	

# c) <u>Control transformer</u>

IEC 204 requires the use of a control transformer on machines or separate parts of the electrical system with more than five electro-magnetic coils. It must be connected downstream of the main switch to allow for its isolation, and preferably between two phase conductors. The incoming supply cables to the primary terminals of the control transformer must be protected against short circuits. On the secondary side, a short-circuit protective device is required in the non-earthed conductor.

Preferred secondary voltages are 24V, 48V, 110V,220V, at 50Hz. Before using low voltages, it must be checked whether fault-free operation is possible.

The control transformer must be adequately rated to keep the voltage-drop within permissible limits even under adverse conditions.

In non-earthed control circuits and insulation monitor must be fitted to indicate earth faults and to initiate disconnection. In earthed systems, the auxiliary circuits must be earthed on one side and one side of the coils must be directly connected to the earthed conductor.

# d) <u>Measuring and recording instruments</u>

All kind of instruments shall provide safe, proper and accurate functions. Last calibration shall be done not more than one year before supply. Testers

and recorders for voltage, current, frequency, polarity, isolation, loop resistance, etc. shall be acc. To EN 61557.

## **2.3Important Criteria for Selection of Electric Devices and Installation** Material

All electrical devices, such as low and high voltage switchgear, switchgear assemblies. Motors, cables, transformer, softstarter, frequency inverter, panels, earthing and lightning protection devices, etc shall be selected under consideration of the criteria as given in the General and Particular Specifications and under consideration of the following criteria.

#### **2.3.1 Overcurrent Protective Devices**

Fuses shall be avoided as far as possible and if not specified in particular, Circuitbreaker and motor-circuit-breaker shall be selected as these devices can be immediately re-closed once a fault has been cleared. Moreover the high stripping accuracy makes them suitable for selective operation. The preferential use of circuitbreakers is a major design criteria. It reduces the problem with replacement of parts as they have no consumables such as fuses.

#### **2.3.2 Motor Protective Circuit Breakers**

Inherently short-circuit-proof switches capable of coping with the highest prospective fault levels at the point of installation without the need for back-up protection shall be selected.

#### 2.3.3 Circuit breakers

Fuseless installation shall be selected, as it offers greater safety and reliability in plant operation. By the use of circuit breakers the required selectivity criteria can be realized.

Circuit-breaker with visible contacts shall be selected in compliance with local accident prevention regulations, requiring visible contacts is to be considered.

Quick-make and quick-brake operation shall be standard. Current-limiting, circuitbreakers shall be used where the prospective fault level is high. Effects of shortcircuits must be reduced to a minimum, as great store is set by the long term reliability of the single devices installed and he plants as a whole.

Use selective operating circuit-breakers for time-selective progression of systems. In general selectivity must ensure, that in the event of a fault arising, only the faulty section of the system shall be isolated.

# 2.3.4 Contactors

Contactors shall be selected whose entire range provides consistently reliable operation in the event of voltage drops – down to 80% U<sub>N</sub> should be aimed for – and whose contact system will not assume an indeterminate position, either on closing or opening, in such conditions.

In the course of selection and detail design of the electrical and mechanical system the Contactor shall consider that it is probable that the voltage stability will – at least for some time – leave much to the desired in many applications, as a result of long spur lines, small local generators or under dimensioned respectively overloaded transformer substation. Moreover regular and long lasting power failures shall be considered.

#### 2.3.5 Main switches and safety switches

Devices with positive contact separation and clear switch position indication shall be selected. The mechanical coupling of the actuating element with the contacts must ensure, that the OFF-position is indicated only when all main contacts are separated by the prescribed distance, and only in this position can the switch be padlocked. Safety must be guaranteed when maintenance or repair works are carried out on the installation or machinery.

#### **2.3.6 Emergency-stop control devices**

Design and function of all emergency-stop control devices to IEC 204-1. When operating these devices, all current loads might lead to danger to personnel or damage to machinery, must be disconnected indirectly by de-energization. For direct manual operation, emergency-stop control devices must have mushroom-head pushbutton with pull to release function. The button must have a minimum diameter of 25mm.

Emergency-stop actuators for mounting in front panels must be designed to IP 65 and tamper-proof to EN 418. They must have a yellow base and a red button with pull to release function. The button must have a minimum diameter of 25 mm.

#### 2.3.7 Enclosures

In buildings with difficult environmental conditions, such as drip water, splashed water, humidity and unusual high or low temperatures totally insulated enclosures with transparent covers shall be selected. Consider special conditions in chemical environment.

In all other rooms enclosures according to the following specifications shall be supplied:

Heavy-duty indoor enclosures, capable of withstanding the most severe conditions to be expected, such as drip water, splash water, constant

humidity and low temperatures. The enclosure complies with EN 60439.1 and IEC 439.1. It is preferably made of self-extinguishing halogen free polycarbonate or, it this type is not available on the market, made from steel sheet with anti corrosion protection and polyster-epoxy coating inside. Degree of protection is IP 54 or higher to IEC 529. The degree of protection against mechanical impacts as per EN 50102 is IK10. Installations inside the enclosure shall provide protection in accordance to IP32 or higher. Protection class 2. Wall fixing shall be made by adjustable wall fixing lugs. The enclosure is equipped with one gland plate with gasket, mounted on the bottom side only. All cables lead into the enclosure through metric cable glands is IP55 or higher. Each gland contains one cable only. A reserve of at least four tight glands for later installation shall be installed. The rigid door is reversible and opens  $120^{\circ}$ . The thickness of the cover/door allows the installation of indicating lights,

120°. The thickness of the cover/door allows the installation of indicating lights, push buttons, instruments, etc. Doors shall be equipped with a lock. Earthing is provided by welded studs in the enclosure and on the door. The enclosure shall be equipped with one mounting plate made from galvanized steel or insulating material for free installation of devices. All equipment to be installed inside the enclosure shall be mounted on mounting rails to EN 50 022. The enclosure shall be directly fixed to the wall using fixing straps.

Cables and devices inside the enclosure, such as fuses and terminals shall be marked accordingly. Single line diagrams shall correspond to this marking.

#### 2.3.8 Automation devices

No PLC device shall be installed in any plant, where not in particular specified, permitted to unavoidable. The specified automation level must be observed. The switchgear shall be constructed in well-tried and reliable but simple design, using standard wiring. Trained operators must be able to detect and clear faults within a short time, without special instruments and without consultation of an external specialist.

Only programmable control relays, which do not require the use of a computer for programming are permitted. The relays shall be programmed directly on the device by use of tabulators 9E.G. Siemens Logo, Moeller Easy, Mitsubishi Alpha, etc.) Programming by computer can also be enabled in parallel, but not exclusively. Each relay shall be equipped with a display, providing essential process information. Relays and accessories shall be with a display, providing essential process information. Relays and accessories shall be with a display, providing essential process information. Relays and accessories shall be with a display, providing essential process information. Relays and accessories shall be with a display, providing essential process information. Relays and accessories shall be with a display, providing essential process information. Relays and accessories shall be dimensioned with a reserve of at least 5 digit input, 5 output relays and once analogue input.

In general the operation programme of each programmable control relays shall be available in one printed version on paper, on two memory cards and on two CD-ROM.

Only one type of programmable control relays from one manufacturer shall be provided.

Programmable control relays which are available with technical documentation in local language shall be preferentially selected. Programme and documentation shall be worked out in the contract language and in English.

Only relays shall be supplied of which the manufacturer guarantees the supply of spare parts and service for at least 5 years. If not specified differently the Contractor must guarantee the supply of spare parts within 10 days.

#### 2.4Execution

#### 2.4.1 Measurements

Accurate measurements required for the roughing in of electrical wiring, and the laying out of electric equipment, shall be taken by actual site measurement or from architectural drawings if available.

#### 2.4.2 Supports

Wall mounted equipment, where shown on the tile wall, or other inadequate to support the equipment, shall be complete with a mounting frame manufactured of angle iron or channel supports, which shall be capable to support the equipment independent of the wall. Outlet boxes shall be adapted to their respective locations and fastened to a rigid support independent of conduit.

#### **2.4.3 Inserts and sleeves**

Where required for the installation of wiring and equipment supplied under this Division, provide all inserts and sleeves, or drill for expansion anchors. Powder activated fasteners shall not be used.

#### 2.4.4 Location of outlets and devices

Location of switches. Thermostats, outlets and control devices are shown diagrammatically only. Location of outlets is subject to change without extra cost to Client, providing information is given prior to installation. Outlets may be relocated up to 5 meters from original location, without change in price.

Keep all switches, thermostats and other controls as close to door jambs and other openings as possible and check door swings prior to installation to locate switches on lock side of door.

All under surface boxes in finished areas shall be mounted so that covers will fit flush with the finished surfaces. Where several separate boxes are mounted in a group, they shall be aligned vertically and horizontally and a uniform parallel spacing shall be maintained.

Mounting heights shall be as shown on drawings and/or as specified under "Mounting Heights". Where the location of any item is shown on any architectural details or elevations, these locations shall govern. No change to contract sum will be allowed for relocation of any item improperly installed or because of failure to check all such details prior o installation of same.

# 2.4.5 Mounting Heights

If not specified differently in the Particular Specifications, mounting heights for outlets and local devices shall be as follows and shall be from centre line of outlet box to finished floor.

- Light switches, combinations and thermostats: 105 cm above ground level
- Sockets and cooker low level, connection outlet: 45 CM ABOVE GROUND LEVEL.

•

# 2.4.6 2Identification of cables and equipment

Cable and wiring shall be identified by means of clip-on type wire maskers of rigid PVC construction. Markers colour shall be WHITE or YELLOW with BLACK engraved letters or numerals.

A number shall be installed on each cable junction point. Number control wires to coincide with equipment shop drawings.

Nameplates in English and local language shall be provided for all pieces of electrical equipment including panel-boards, motor control centres, terminal cabinets, disconnect switches, motors starters, contactors, push button stations, junction boxes and pull boxes.

Nameplates shall be laminated rigid plastic on interior items and stainless steel in exterior items with 5mm high engraved letters. Nameplates shall be fastened to equipment in a conspicuous location. In case of flush mounted panels in finished areas, nameplates shall be submitted to the Consultant for approval.

Buried cables and conduits shall be identified by cover plates with appropriate markings.

#### **2.4.7 Installation of conduits**

Conduits, in all finished areas, shall be run concealed in ceiling spaces, walls, partitions, or in floor slabs. Where conduits are fund in floor slabs, they shall be laid between the layers of reinforcing steel or wire mesh. Obtain structural engineer approval for conduits laying pattern.

Conduit ends shall be reamed and open ends capped with proper conduit caps immediately after installation.

Flexible conduit shall be used only for final connections, as to motors and lighting fittings. Such flexible conduits out to exceed 2 meter in length for motors lighting fixtures. For liquid pumps and damp locations liquid-tight flexible conduit shall be used complete with insulated watertight connectors.

Where conduits are run exposed, they shall be installed accurately in line and level and parallel to building lines. Where run exposed on concrete or masonry walls, conduits inserts and where run on building steel, beam clamps shall be used. Where conduit runs cross building expansion joints, expansion couplings shall be installed. Where conduits are installed as part of an empty race way system, conduits shall have sweep bends with a minimum bending radius of six (6) items conduit diameter where change of direction occurs. No empty conduit run shall have more than two (2) 90 degree bends between pull boxes. All empty conduits shall contain a draw wire.

Where necessary for proper pulling of wiring, pull boxes shall be installed and located so as to be accessible after completion of building.

Suspended conduits shall be supported from ceiling or roof slabs above with galvanized steel threaded rods and fasteners on U channel brackets. Conduit clamps shall be heavy duty cadmium plated steel or PVC with adjustable saddles. Wire as used for ceiling suspension and perforated pipe straps with not be accepted. Cover screws on all conduit fittings and junction boxes shall be carefully cut to lengths to avoid damage to wires.

#### 2.4.8 Wire and cable installation

All new equipment shall be supplied and installed in accordance with environmental conditions, especially considering wet atmosphere and chemical influence Power cables shall be installed either on cable trays or on surface throughout in rigid cable conduit. A PVC –corrugated pliable conduit for heavy gauge (750N) to IEC 325-EN 3341 shall be installed. Temperature range:  $-10^{\circ}$ C up to  $+60^{\circ}$ C. Only approved and suitable fittings shall be installed and clips for installation on surface shall be used. The fittings shall be water and sand tight. For connection to the switchboard pliable conduit glands shall be used. The conduit shall be to IP 54. The protective cable conduit shall be marked in a regular distance of 3 meters by use of water and UV resistant markers. The cables shall be marked on both ends.

Splicing of conductors shall not be done unless approved by the Consultant and permitted by regulations. Conductors shall be joined at a single or multiple connector blocks in boxes, cabinet or fittings.

Exposed cables shall be installed in accordance with relevant Approvals and Standards as well as manufacturer's instructions and recommendations using manufacturer's approved installations tools.

Where a number of cables on cables trays follow same general route, they shall be fixed on the tray beside each other only. Single and multi-conductor cables shall be spaced to avoid de-rating the conductor current carrying capacity. Cables shall not be bundled up anywhere. Signal, data and telephone cable trays. The cables shall be fixed to the tray with suitable supporting clamps or cable straps in line parallel to run off track.

Termination of metallic sheath and interlocked armored cables shall be in accordance with the manufacturer's recommendations and instructions. Termination and connectors shall be dust and moisture tight and be shrouded with a heat shrinkable tubing of appropriate size, shrunk tight with a heat gun as per manufacturer's instructions. Shrunk tubing shall cover connectors completely, such that no exposed metal shall show between connectors and box or wiring device. Tubing shall also cover cable leading to connectors for a minimum length of 25 mm. Flexible conduits motor connections shall include a green earth wire, bonding motor box to metal conduit.

Cables shall terminate through brad compression-type glands which grip the sheath, clamp the armouring and seal the gland and outer sheath.

In case of aluminum single conductor sheathed cable, load end shall terminate in as insulating plate (ferrous enclosure shall be slotted to prevent a closed magnetic loop), and a copper bonding wire shall be installed from supply end to load end.

Cable tails shall be adequately insulated and identified.

Cables shall be carefully taken from spools and reels, in manner recommendation by manufactures to avoid kinks and twisting. Bends must be made with minimum bending radii recommended by manufactures, with all bends measured to inside diameter.

Cables shall be run in single continuous lengths as no splices will be allowed.

Particular consideration shall be given to pulling tensions and cable lubricants during installation of cable, which shall be in accordance with the cable manufacturer's recommendation and instructions.

Attach cables to cable trays with cable ties or clamps. On cable trays energy and control cables shall be fixed in a distance of >100mm. If metal separators are installed between the cables in the tray, the distance is not required any more.

# 2.4.8.1 General instruction for outdoor installation

Outdoor the contractor shall lay all power and control cables as far as possible in a trench together with pipes. Co-ordinate the lines of the cable trenches with pipe trenches. For specifications of trenches see separate item of General Specifications. Before execution of works the Contractor shall fix the exact trench line and measure the exact cable length required. Cables longer than 50 meter and/or with a bigger diameter than 20mm shall be supplied in a cable drum. In general all cables shall be installed in one unit. No cable joints or terminal boxes are permitted.

Power control cables shall ve installed throughout in separate protective cable conduits. Inside the cable trench cover plates shall protect cable and cable conduit. The Contractor shall supply and install these palates in accordance with effective Specifications and Standards.

A galvanized round earthing wire 10mm<sup>2</sup> shall be laid in each trench in the sand above the cable cover plates. The wires shall be connected to the Local Equipotential Bonding Bars as both ends.

Latest one day after cable installation in the trench an insulation test of all cores to each other and to earth and a resistance measurement of all cores shall be made. Within this test the phase sequence of power cables shall be fixed. The cores shall be labeled accordingly with "L1"/"L2"/"L3". The tests shall be executed with professional instruments and in accordance with relevant Standards. A protocol shall be issued and handed over to the Engineer. The protocol contains a description of the test method, the test results (measured data), time and date of test, name and signature of the Contractor.

Protective cable conduits for underground installation in trench shall have the following minimum internal diameter:

- a. Cable with a diameter from 41mm to 50 mm:  $\geq$  90mm
- b. Cable with a diameter from 26mm to 40mm:  $\geq$  75mm
- c. Cable with a diameter from 10 to  $25mm \ge 50mm$
- d. Cables with a diameter up to  $10mm \ge 30mm$

# **2.4.9 Dimensioning of power cables**

Power and control cable connections to motors shall be in accordance to these specifications for cable installations. Connections up to a cable size of 10mm<sup>2</sup> shall either be done with a cable type YSLYQY (LSYYQvY) or PVC Insulated Single Core Cable type NYY (E-YY). Connections bigger than 10mm<sup>2</sup> shall be done with type NYY only. All cores and cables shall be installed throughout short circuit-proofed. Maximum distance between cable fixing devices shall be two meter. Only short circuit-proof and antimagnetic

fixing devices which can withstand the environment conditions shall be used. Single core cables must be identical length for each phase and for new

Single core cables must be identical length for each phase and for neutral. Unbalanced load conditions are not permitted. Dimensioning shall be in accordance to relevant Standards, operating conditions and especially considering the starting conditions. The maximum permitted voltage drop between the switchboard and the
terminals of the motor shall be 0,5% during nominal operations. The contractor shall provide a calculation prior to supply and installation.

In principle all cores and cables shall be installed in one unit only. Cable joints and/or terminal boxes are not permitted. Too short or damaged cables must either be extended not being repaired but have to be replaced.

Cables shall be supplied and installed in principal in own unit: no cable joints are permitted.

Dimensioning of cables shall be done according to the maximum power consumption of the connected device respectively of the connected system under consideration of the cable length and including a reserve capacity of at least 20%. The voltage drop between the low voltage terminals of the transformer and the connected devices shall not exceed 3% of the nominal voltage during operation with rated power. Provide calculations for approval to the Engineer.

## 2.4.10 Mounting of starters

Separately mounted starters shall be mounted in enclosures according to environmental conditions and relevant specifications. Panels shall be made of selfextinguishing halogen free polycarbonate and supplied complete with wire trough, and all necessary fittings and labeling.

#### **2.4.11 Services for Other Divisions**

Work under this section of the specification shall be fully co-ordinated with the requirements of equipment specified and other applicable Division/sections of this contract.

#### 2.4.12 Earthing

## 2.4.12.1 General Specification

Equipment requiring earthing by relevant Standards (IEC,IEE Electrical Code, National and Local Standards) and regulations of Local Electricity Utility shall be earthed accordingly and included in the work under this section of Specification regardless of whether it has been shown on drawing or called for in these Specifications.

Installation shall be made in accordance with Type of system (e.g. TC-C-S). New buildings and constructions shall be equipped with a foundation earthing. Galvanized flat or round iron including suitable accessories in

accordance with present-day installation standard shall be used for installation on the foundation. In foundations the earthing iron shall be connected to the reinforcement in a regular distance of at least 2 meter. Connection flags and local equipotential bonding bars shall be provided wherever switchboards, sub-panels, enclosures, machines, motors or other installations requiring grounding and/or local equipotential bonding with electric installations are being installed. PE-conductors shall be green-yellow colour coding only and directly grounded.

In principle 10mm round steel conductor with zinc coating =  $50\mu$ m mean value or  $30 \times 3.5$ mm steel tape with zinc coating = $70\mu$ m mean value shall be supplied and installed.

The earth resistance shall not be higher than 10 0hm. Great importance is attached to accurate execution of works so that the installation permanently withstands the environmental stress and that reliable protection and system function in guaranteed.

Arrange earthing system in such a way that under normal operating conditions no injurious amount of current will flow in nay earthing conductor. Single phase loads shall be connected so that there is least possible unbalance of three phase supply.

Earth lead-ins shall be corrosion protected. The protective coating shall be of bitumen or shrink sleeve. The protection shall reach for a minimum of 0.3m above abd below the earth point.

Deep driven earth rods shall be made of hot-galvanized steel; they shall be joined together using spigot and hole. Minimum rod length shall be 1.500mm; minimum cross section shall be 25mm. use impact tips and driving leads for driving down the rod.

Connections of components /conductors made of different material such as steel or aluminium with copper require additional measures against corrosion. Use bimetallic connectors or isolating clamps or inlays made of double metal( copperplated aluminium sheets or sleeves) according to requirements. Intermediate lead layers are not permissible.

## **2.4.12.2 Foundation Earthing**

Foundations shall be equipped with a earthing device. Supply and install either a round galvanized wire  $10 \text{mm}^2$  or a galvanized flat iron 30 x 3.5mm. fix the earthing iron vertically inside the reinforcement and connect it in a regular distance of max 2 meter to the reinforcement. Connections shall be made with special connectors and/or cross clamps suitable for this purpose.

Install isolated connection flags type "NYY1 50 mm<sup>2</sup>" and lead them close to the outside wall to all four corners of the building. The flags shall be the connection point for the external lightling protection device.

The connection to the inside of the building shall be made with fixed earthing terminals. Provide and install three units. Exact location is subject to detail planning of contractor and requires approval of Consultant.

## 2.4.13 Local Equipment Bonding

All conductive steel parts such as water pipes, metal enclosures, railing and reinforcement shall be connected to local equipotential bonding bars. Only greenyellow NYM-J cable with a minimum size of 1X4 mm<sup>2</sup> shall be used. The static temperature range shall be  $-10^{\circ}$ C up to  $+70^{\circ}$ C. the installation including the contacts shall permanently withstand the environmental conditions. The cables shall be installed throughout in cable conduits or on cable trays. Cable glands shall be used for cable connections at switchboard or enclosure to ensure the required degree of protection (IP). Inside the enclosure each wire shall be connected either on a separate terminal or screwed to the local equipotential bonding bus bar.

Proper earthing shall be provided for bus bar risers, power panel boards, distribution equipment, metal conduits enclosures, main neutral bars, non-current carrying metal parts of fixed cabinets, motors, starters, socket outlets, lighting fittings, power and communication trunking, telephone equipment, signal equipment and the like. Bond separate equipment sections or items less than 2m apart to each other or to a common earth bar with Yf wire >10mm<sup>2</sup>.

At completion of installation, tests shall be conducted under consideration of relevant Standards and as prescribed in Particular Specification. All tests in general shall inclide polarity, phasing, continuity, earth loop resistance, voltage tests and empty conduit tests. Date and time tests shall be announced at least one week in advance to the client and to the consultant. Correction shall be made necessary and as directed by the consultant

Resistance of earth electrodes shall not exceed the maximum permissible values for each type of installation or equipment concerned. If necessary change arrangement until satisfactory results are obtained, at no extra cost to client. Electrodes shall consist of sectional solid copper rods, with concrete inspection box and cast iron cover.

Voltage provided to equipment in this installation shall fall within minimum and maximum permissible limits for equipment. Make necessary adjustments such as changing of transformer taps to effect same, at no additional cost to Client. Maximum voltage drop between main new switchboard to any point shall not exceed 2.5 percent.

## **2.4.14 Lighting Protection**

The external lighting protection shall be installed to IEC 62305 and DIN EN 50164. Only new components of industrial standards with origin from a specialized manufacturer shall be supplied. Equipment and installation shall be the state of the art. Submit prior to supply and installation a detail design of the complete external lighting protection including specification and origin of equipment.

Using synthetic lighting protection components in connection with roof covers made of roof sheeting, the material compatibility (long term endurance) has to be checked with the manufacturer of the roof cover or with the manufacturer of the lighting equipment.

Connections of components/conductors made of different materials such as steel or aluminum with copper require additional measures against corrosion. Use bimetallic connectors or isolating clamps or inlays made of double metal (copper-plated aluminum sheets or sleeves) according to requirements. Intermediate lead layers are not permissible. Air termination Rods for protection of roof superstructures, chimneys, e.tc and also for installation with concrete bases shall be supplied and installed. The rods shall be chamfered, suitable for wedge concrete bases, made of AIMgSI 16mm or St/tZn 16mm. use connecting sleeves for connections of Air Termination Rods. Use roof bushing for penetrating and sealing flat roofs of gable roofs to install down conductors systems.

Use high voltage resistant insulating down conductor for keeping the separation distance from conducive parts to prevent dangerous flashovers among parts of external lighting protection systems and internal conducive parts (electrical installation, conduits, e.t.c). Equivalent separation distance s=0.75m The sketched show principal installation standards and techniques. New installation and repair works shall be made acc. To these installations and to relevant IEC standards.

#### 2.4.15 Testing

At completion of installation, tests shall be conducted under consideration of relevant standards and as prescribed in Particular Specification. All tests in general shall include polarity, phasing, continuity, earth pool resistance, voltage tests and empty conduit tests. Date and time of test shall be announced at least one week on advance to the Client and to the Consultant. Correction shall be made where necessary and as directed by the consultant.

Use a professional megger to measure lighting and power circuits and if resistance to earth is less than 5.0 megaohm such circuit shall be considered defective and shall be replaced at no cost to Client. This condition refers to installations provided under this contract.

Test all equipment installed under this division for mechanical and electrical defects. Make all adjustments necessary for such equipment. When equipment has been placed in permanent operation, provide necessary tuition and instruction in operation and maintenance to Client's operating personnel. Test conduits which are required to be installed but left empty for clear approximately 85% of conduit inside diameter shall be used. Clear any conduit which rejects ball mandrel in an approved manner and without damage thereto.

Furnish labour, materials, instruments and bear other costs in connection with tests, obtain required certificates of approval, acceptance with compliance with regulations of agencies having jurisdiction. Work shall not be deemed complete, and final certificate of acceptance will not be issued, until such certificates have been delivered to consultant.

Forward three copies of all test certificates to the consultant for his retention but the submission of test certificates shall not relieve the contractor of his obligations. The installation will not be accepted, nor a certificate of Completion issued, until such tests have been approved by the consultant. As second series of similar tests shall be carried out to the satisfaction of the Consultant within fourteen days prior to the expiry of the maintenance period.

## 2.4.16 Underground ductwork

Standard rigid heavy-wall PVC duct lengths and fittings shall be used wherever applicable. When cutting is necessary, duct ends shall be cut square and clearly. Joints shall be made by standard coupling, ducts entering cable trenches, e.t.c shall be provided with end bells.

Excavation and backfilling work shall be carried out according to Specifications and to the approval of the engineer.

Ducts shall be thoroughly swabbed and cleaned by pulling through a cloth swap or large enough size to properly clean ducts, and shall be capped or plugged at both ends immediately after cleaning, to prevent entrance of foreign materials.

#### **2.4.17 Bus Duct Installation**

Install Bus Duct in strict conformance with manufacturer's instructions and to approval of responsible utility.

#### 2.4.18 Excavation and backfilling

Do all excavation and backfilling for all electric power control and telecommunication cable, earthing and local equipotential bonding wires, earth electrode boxes, ducts for cables from public utilities, entry boxes and similar equipment. Work shall be performed to meet the specification requirements of other sections.

## 2.4.19 Concrete works

Do all concrete works for entry boxes and duct banks. Work shall be performed to meet the specification requirements of the respective General Civil Specifications. Concrete duct banks shall be coloured with red concrete additive over entire length. Place cable cover plates as specified over power ducts.

20.4.20 Lighting

## 2.4.19.1 Documents

This section of the specifications is an integral part of the contract documents and shall be read accordingly.

## 2.4.19.2 Extent of work

The contractor shall provide all labour, products, equipment and services to complete the work for lighting. Lighting , including writing , appurtence and other associated products, consists of, but is not necessarily limited to the following:

- Light fittings
- Accessories, hangers and supports
- Lamps and tubes
- Ballasts
- Lenses and louvers

## 2.4.19.3 Lighting fitting brochures

Provide complete lighting fitting brochures, which shall be bound and clearly indexed and included in the maintenance manuals

## 2.4.19.4 General Requirements

The contractor shall note the following general requirements applicable to the fixtures described:

a) General

The contractor shall supply and fix the lighting fittings and points as required complete with all accessories, wiring, trunking, conduiting, boxes, etc. Lighting fittings shall be complete with suspension system, tubes, ballasts and accessories as required for operation.

Fittings housing, frame or canopy shall provide a suitable cover for the fixture opening. Fittings shall be installed at mounting heights as detailed on the drawing, given in the particular specifications or instructed on site by the Consultant.

Fittings are shown in provisional position. They shall be exactly located in cooperation with the Client and/or the Consultant.

Fittings located on the exterior of the building shall be installed with non-ferrous metal screws finished to match the fittings.

Fittings and/or fitting outlet boxes shall be provided with hangers to adequately support the complete weight of the fitting. Design of hangers and method of fastening other than shown on the drawings or herein specified shall be submitted to the Consultant for approval.

Flush mounted recessed fittings shall be suitable for the type of false ceilings used, and shall be installed so as to completely eliminate leakage within the fitting and between the fitting and adjacent finished surface.

Pendant fittings within the same room or area shall be installed plumb and at a uniform height from the finished floor. Adjustment of height shall be made during installation. Fitting shall bear the manufacturer's name unless otherwise approved. Lighting fittings employing tungsten filament lamps and having metal back plates shall not be fixed direct to the boxes of thermo plastic material. Only metal boxes shall be used in such situations. Heat resistant type lamp holders shall be used with flexible cords and enclosed type lighting fittings regardless of the lamp cap position, i.e. cap-up or cap down.

Lamp holders incorporated in weatherproof fittings shall be porcelain or brass. Fittings installed externally shall be weatherproof and insect proof in general and shall conform to the specific IP ratings mentioned in the particular cases.

Fittings installed in damp locations shall be totally enclosed and shall prevent the ingress of moisture.

Fluorescent fittings shall contain all associated control gear within the fitting. All metal fittings or metal parts of fittings shall be effectively earthed. Fittings installed in positions subject to vibration shall be of the antivibration type.

Recessed fittings shall be constructed so as to fit into tile suspended false ceilings, the fixed to ceilings or other suspended false ceilings or plastered ceilings without distorting either the fitting or the ceiling and including all necessary labour for cutting and making dood.

Fittings with hinged diffuser door shall be provided with spring clips or other retaining devices to prevent the diffuser from moving and the diffuser shall remain hanging, during relamping and maintenance.

Shop drawing for non standard fitting types shall be submitted for approval to the Consultant.

Detailed catalogue cuts for all fittings or if so required by the Consultant, sample fittings shall be submitted for approval to the Consultant before orders for the fittings are placed

#### b) Fluorescent Fittings

Wherever a fluorescent lighting fitting is located over an expansion joint, one end of the fitting shall be free to move or slide. Recessed fittings shall be constructed so that all components are replaceable without removing housing from the ceiling. Each ballast shall be provided with external fuse rated in accordance with ballast manufacturer's lowest case temperature rise rating and shall be noiseless in operation. All ballasts shall conform to the IEC Standards. Ballasts shall be for operation at the voltages and frequencies indicated under fitting types and/or on the drawings, and under temperature conditions prevailing in the various locations of the site. Surface mounted fittings longer than 60cm shall have one additional point of support besides the outlet box fitting stud when installed individually.

## c) Incandescent Fittings

Incandescent fittings shall be equipped with porcelain, medium lamp holder, bayonet type lamp holders for lamps up to and including 150 watts and right hand screws type lamp holders for lamps 200 watts and above. Replacing the lamp shall be possible without having to remove the fittings from its place.

## 2.4.19.5 Lamps

## a) general

In general LV halogen lamps shall have individual or groups, step down transformers of dimmable or non dimmable and magnetic type as shown on the drawings. The step down transformers shall conform to relevant IEC Standards and marked in protective enclosures. Lamps shall be furnished and installed in all lighting fittings furnished under this contract. Lamps used for temporary lighting service shall not be used in the final lamping of fittings.

#### b) <u>Fluorescent</u> Tubes

Lamps shall be of type, wattage and colour rendering index as herein specifies unless otherwise indicated on drawing. All fluorescent lighting luminaries shall be provide with capacitors to give P.F in excess of 0.9 lagging. Capacitors shall comply with relevant IEC Standards.

#### c) <u>Incandescent lamps</u>

Lightning fittings shall be installed accurately in line and level. All fittings that are not, in the opinion of the consultant, installed properly shall be taken down and reinstalled to his satisfaction without cost to the client. Fittings shall be left clean, free from dirt, grease, fingerprints, e.t.c. upon completion of installation all lighting shall be checked by a qualifies electrical technician employed by the contractor. Correct operation shall be demonstrated to those appointed, in the presence of the Consultant.

## 2.5Products

## 2.5.1 Wire and cable

## 2.5.1.1 General

• Abbreviations keys for wires according to harmonized requirements

• Building wire

• Wires installed outside of switchboard and enclosures shall be minimum size 1.5mm<sup>2</sup> single core unless shown otherwise. All conductors shall be stranded soft annealed copper of high purity with PVC, insulation. Notice particular specifications for wires and cables. No aluminium conductors shall be used.

• Conductors for lighting fixtures and wiring through fixtures channels shall be stranded copper with heat resisting insulation and glass braid or equivalent type approved for such duty, minimum 300/500V nominal voltage.

• MICC cable shall consist of copper conductors, mineral insulation and double copper sheath and shall be complete with manufacture's approval seals, gland and fittings. Follow manifacturer's instructions on cable installation and terminators. Use MICC cable for fire alarm circuits and any other essentials services subject to fire or explosion hazard

• Single core cables shall have non-ferrous armour

Single core cable shall be supported by non-ferrous clips.

# 2.5.1.2 NYM (PVC Sheath wire)

Solid or stranded copper conductor, conductor, core insulation of PVC, cores are stranded, common core covering, PVC outer sheath. Cable shall contain terminate protections.

The cables are suitable for use in, on and under the plasters, in dry, wet and damp rooms, as well as in brickwork or concrete, with the exception of direct laying of shaked, vibrated or compressed concrete and not suitable and not suitable for laying directly in earth.

Norminal voltage Uo/U: 300/500 V. Specific insulation resistance: 20 MOhm x km. conformity to EEC directive 73/23 (Low Voltage Directive) CE. Temperature range after installation:  $-10^{\circ}$ C up to  $+70^{\circ}$ C. Test voltage: 4kV. Core ident code in acc. to VDE 0293.

# 2.5.1.3 YMS (PVC Sheathed Wire) Adapted to

# DIN VDE 0821-5/ÖVE-K41-5

Construction: Fine stranded bare copper conductors. Cores are insulated with PVC and stranded. Reinforce outer sheath of PVC. Cable shall contain termite protection! Application: For strong mechanical stress in dry and humid locations as well as outdoors.

Temperature range:  $-5^{\circ}$ C till  $+70^{\circ}$ C. Nominal voltage 450/750V.

## 2.5.1.4 NYY (PVC Insulated Multicore Cable)

According to DIN VDE 0276-603. Conformity to EEC directive 73/23 (Low Voltage Directive) CE.

Nominal voltage 0.6/1.0 kV. Single wire conductor of plain copper wires, PVC core insulation, cores twisted concentrically, various core colours according to VDE 0293, common core sheathing, outer sheath of PVC, standard colour black, flame retardant. Cable shall contain termite protection. Conductor configuration according to VDE 0295/IEC 60228; re=round conductor, single wire. Temperature range after installation:- $40^{\circ}$ C till +  $70^{\circ}$ C. cable shall contain termite protection.

# **2.5.1.5 YSLCY (PVC Control Cable with Copper Braiding)** Adapted to DIV VDE 0281-13

Construction: Fine stranded bare copper conductors, core insulation of PVC. Green –yellow core in the outside layer. All other cores are black with consecutive whole numbers (starting with 1 inside). Cores are stranded in layers and wrapped in a plastic foil. Braiding of oxidation protected tinned copper round wires. PVC outer sheath. Increased oil resistant and flame – retardant. Cable shall contain termite protection.

Application : Suitable as a signal and impulse cable in the control, measuring and signal technology. The copper braiding optimizes protection against external interferences, like electromagnetis fields and stray frequencies.

Nominal voltage Uo/U: 300/500V. temperature range for fixed installation: -

 $40^{\circ}$ C till +  $70^{\circ}$ C. Core ident code: up to 5 cores coloured in acc. to VDE 0293. Seven or more cores: black with white numbers. Specific insulation resistance:20 GOhm x cm. Test voltage: 2kV

# **2.5.1.6 YSLYQY (PVC Control Cable with Steel Wire Braiding)** Adapted to DIN VDE 0281-13

Construction: Fine stranded bare copper conductors, core insulation of PVC. Greenyellow core in the outside layer. All other cores are balck with consecutive whote numbers (starting with 1 inside). Cores are stranded in layers, inner sheath of PVC. Braiding of galvanized steel wires. PVC outer sheath. Increased oil resistance. Transparent. Cable shall contain termite protections.

Application: suitable as power and control cable with increased mechanical stress resistance for rough operating conditions. Temperature range for fixed installation:  $-40^{\circ}$ C till  $+70^{\circ}$ C. Nominal voltage 300/500V.

## 2.5.1.7 H07V-U (Ye), H07V-R (Ym) (PVC Insulated Single Core Wire)

According to DIN VDE 0281-3/ÖVE-K41-3

Construction: Solid or stranded copper bar conductor. Core insulation of PVC. Cable shall contain termite protection

Application: For indoor fixed installation in dry locations in switchboards and distributors, on surface mounted or embedded conduits or directly in suitable insulated objects. Temperature rane or fixed installation:  $-5^{\circ}C$  till +  $70^{\circ}C$ . Nominal voltage 450/750V.

## 2.5.2 Cable trenches

Notice: In general National Standards for cable trenches and cable installation are to be obeyed. As far as the National Standard do not require different solutions, the sketched and referring data and osntructios as shown in this chapter of the Specification are to be considered as standard solutions. Notice, that the crossing of roads may – beside other measures – require a different depth of the trench.

## 2.5.2.1 Layout of standard cable trenches Diagrams

- Excavate cable trench
- Refill bottom of trench with sand respectively screened filing material and compact with rammer
- Layout pipes respectively cables. Minimum distance between power cables shall be 20 cm. minimum distance between power and control cables shall be 100mm.

• Fill in the area around the pipes with screened filling and compact. If cables are without conduit, use sand for filling. A minimum of 10cm sand shall be around each cable

- Lay out cable cover plates
- Lay out earthing wire
- Refill the cable trench and compact backfill material

Notice: Installation of cable abd refilling of cable trench has to be done on one day. Pull cable from lifted cable drum only. Torsion in the cable must be avoided. The contractor shall provide a area map of the site showing the exact path of all underground installed cables.

## 2.5.2.2 Protective cable conduit for underground installation in trench

Flexible twin walled cable conduit made from High Destity. Polythylene (HD-PE) to BS EN 50086-2-4. The construction shall offer high flexibility and compression strength. The plain inner surface reduced friction when drawing the cable. The conduit shall provide a high degree of shock

resistance, even at low temperatures. Static temperature range:  $-40^{\circ}$ C up to  $+100^{\circ}$ C. Only approved and suitable fittings shall be used to connect the cable ducting. The fittings shall be water and sand tight.

# 2.5.2.3 Protective cable conduit for an surface installation in building and in walls outdoor.

Inside the building power cables shall be installed on surface throughout inside a cable conduit wherever they are not installed in cable trays. Specification: Flexible PVC corrugated pliable conduit for heavy gauge (750N) to IEC 325-EN 334.

Temperature range:  $-40^{\circ}$ C up to  $+60^{\circ}$ C. Only approved and suitable fittings and clips for installation on surface shall be used. The fittings shall be water and sand tight. For connection to the switchboard in the storage reservoir and in the building No.3 PVC pliable conduit glands shall be used. The conduits shall be to IP 54. The protective cable conduits shall be marked in a regular distance of 3 meter by use of water and UV resistant markers.

#### 2.5.2.4 Protective cable conduit for under surface installation Conduits

**embedded in walls and floor slabs** shall be in high impact PVC. Notice also General and particular specification for installation equipment **For cable installation in trenches** use a cable protection system with high compression strength properties for multiple use. The conduits shall have a corrugated exterior and a smooth interior. Compression strength shall according to requirements but minimum 450N.

**Ducting for Optical Fiber Cables** shall be manufactured form high grade Polyethylene-high density (PE-HD) with smooth exterior, longitudinally grooved interior, UV stabilized.

**Pressure connectors and fittings** for OFC Ducting shall be pressure resistant up to 16 bar and consist of traction strength up to 5000N. **Transport :** Ducts for fibre optical cables from PE-HD require transport in specially prepared trucks(clean loading space, no nails, screws or other objects that could harm the conduits) need to be loaded and unloaded by special lifting devices and fixtures (belts or hemp ropes). If the conduits are handled by means of a fork lift truck the forks shall be equipped with suitable protection (rubber of PE wrapping) to avoid any damage on the conduit. In no case the coils shall be thrown or pulled over the edge of the loading space. Dragging the coils over the floor or re-arranging coil piles may also cause harms on the conduit surface and it is advised to pay particularly attention to a careful moving of the coils at any time. Such harms could lead to a malfunctioning of the conduits when under pressure. Coils and drums shall be shipped on palettes. During transport the coils shall also be piled horizontally.

**Storage:** The conduits must be stored in an environment with extreme outer physical influences and temperatures(.e.g intensive sunlight.), which may result in changes of the microstructure of Polyethylene and deformation of the conduit profile. Pacable drums shall be stored on even and clean surface and shall be protected against weather influences.

**Connection of conduits:** worked have to be trained in correct handling of connectors and coupling of the conduits. All jointing methods have to be followed strictly to achieve a quality connection in the whole system. Ensure perfect tidiness as it is an important factor for the reliable and functioning conduit connections.

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## 2.5.2.5 Cable cover plates

Made from high impact resistant PVC resp. Polyrthylene. The cover plates shall be provided with interloacking fasteners which allow simple and effective connections on site. Temperature rating :  $-5^{\circ}$ C to +  $60^{\circ}$ C Min width: 120mm, Min. thickness:1.8 mm.

## 2.5.2.6 PVC underground warning tape

Flexible polyethylene twin walled high density polyethylene tape for underground installation. Suitable for Identification and warning of a potential hazard of underground services during excavation works. Temperature range: -40  $^{\circ}$ C up to +75  $^{\circ}$ C, min. width: 35mm; min.thickness: 0.40mm. the tape shall contain termite protection.

#### 2.5.3 Local devices

#### 2.5.3.1

#### Outlets

Each light, switch, wall or floor receptacle (socket) or other outlet shall be provided with an outlet box. Outlets and local devices used in this installation shall conform with the following requirements.

All outlet and junction boxes shall be complete with an earthing terminal. All boxes shall be minimum 75mm square or round boxes for attachment of fittings; they shall be complete with fittings stud or clamp if required to support safely the weight of the light fittings. Where the fitting weight is excessive for such devices, provide plates or channels fastened to ceiling structure.

Larger or extra deep boxes shall be used where required to accommodate the wiring and devices contained therein without strain or crowding. Using suitable system boxes where several switches are ganged and 2-gang boxes for twin socket outlets.

## 2.5.3.2 Raceways

Cable trays and ladders shall be of heavy duty galvanized steel or heavy duty GRC complete with fittings, accessories and supports. They shall be of "lay-in" type. Trays will be manufactured with a longitudinal T welded safety edge along the top edges. The tray shall be manufactured from steel wires, welded together and bent into a final U-shape. Straight sections shall be provided in at least 3000mm length. The cable tray shall be electroplated with at least 12 microns of zinc. The cable tray internal depth shall be 50mm +/-10min.

Trays made of steel wires shall be made with a minimum wire diameter of 4.5 mm for widths from 50 to 200mm and 5mm from 300 to 450mm. Trays shall be constructed with a mesh configuration not wider than 50 mm x 100mm. All tray fittings (bends, risers, tees, crosses, reducers, etc) shall be constructed on-site using side action bolt croppers and fastened using 25mm and 30mm counter clamps with bolts and nuts, all surfaces shall be treated as noted above.

Trays will be coupled together using either fast spring couplers or counter clamp with bolt and nut combination with supporting fishplate is necessary, all surfaces shall be treated as noted above.

Trays shall be supported at 6-foot intervals by either trapeze, wall, floor or pendant mounting methods. All welds will be manufactured to a tensile strength of 700 kg per weld.

Metal separator shall be installed on the trays between power and control/telecommunication cables.

## 2.5.3.3 Conduits

Conduits shall be rigid heavy wall type, of high impact PVC. Minimum internal diameter shall be 20mm. Provide draw wires in all empty conduits.

## 2.5.3.4 Pull and junction bores

Indoor pull and junction boxes shall be of PVC only, complete with screw-on cover and conductor terminals. Pull boxes shall have a minimum length of 8 times the diameter of the largest conduit entering the box.

## 2.5.3.5 Outdoor enclosure

Enclosure made of weather and impact resistant PVC or, if not available on the international market, made of 2mm aluminium/zinc sheets, E-coat printed, powder painted. Frame made of PVC or stainless steel. Protection class IP55 or higher. Enclosure equipped with one PVC-mounting plate inside. All metal parts shall be connected to Local Equipotential Bonding. Enclosures tested in accordance with DN IEC 68, and IEC 721. Connection value acc. to nominal data of connected load. Consider also transformer overload capacity. Mains voltage 230/400V, 50Hz. Cable inlets only from bottom or backside. Cable glands made for exterior purposes, corrosion free, weather and impact resistant. Casting equipped with a PVC-mounting plate inside.

## 2.5.3.6 Sockets

Nominal data; 16a/240v A.C. Rectangular pin shuttered switched socket outlets, single or twin type as shown on drawings, to BS1363 in stainless steel plates with moulded plastic inserts in equipment rooms and in metallic plates in all finished areas. Protection against electric shock to IEC 536: Finger and back-of-hand proof. Type of protection: IP XI.

Cooker control unit outlet shall consist one flush mounted box and associated cooker connector unit with terminal block, cable clamp and cover plate to relevant Approvals and Standards.

Shaver supply unit outlet shall be complete with isolating transformer, on-off switch, pilot light, 230-120 selector and universal shuttered socket outlet, with matching mounting accessories. Engrave cover with "shaver only" in Local Language.

Cover plates for weatherproof outlets and devices shall be die cast aluminium with stainless steel fastenings of equivalent non-corrosive materials with spring-loaded covers where applicable.

#### 2.5.3.7 Light switches and dimmer

Light switches shall be rated at 230V and shall be single pole 1-way, 2-way, intermediate or DP as shown on drawings and as required for proper operating of switched circuits. Switches shall be designed to safely carry inductive and resistive lighting loads up to their full ratings. Switches for incandescent lights shall be 6A, switches for fluorescent lights shall be 16A. Dimmer switch shall be full solid state, with rotary dia permitting smooth control from full brightness to complete "off" position, shall be equipped with RFI (radio frequency interference) filter to prevent interference with radio, TV or telephone circuits. Minimum load capacity 50% above connected nominal load.

Motor Control Centres (MCC's) shall be from manufacturer only. The MCC's shall incorporate the following components if not specified differently in Particular Specification:

Main ACB/MCCB with 3 phase indicating lights and 3 amperemeter (analogue or digital), one voltmeter with one 7 position selector switch.

Motor protective relays according to requirements and relay specification

D.O.L. or Star/Delta starters incorporating MCCB protection in line with the single line drawings and requirements of Electricity Utility.

Softstarter and/or frequency inverter may be specified in the Particular Specification and require different control and protection devices.

- Run/trip pilot light for each motor
- Duty selector switch
- Emergency shut down device
- Over-/Under Voltage relay
- Single Phase protection device

Power factor correction equipment if required according to Specification and regulations or Electricity Utility.

Note: If not specified differently in the Particular Specification the following starting devices shall be installed: motors with a nominal power of up to 11kW shall be started directly. Motors with a nominal power between 11kW and 90kW shall be started with Star-Delta Starters. Motors with a nominal power above 90kW shall be started with softstarter.

#### 2.5.3.9 Disconnets

Disconnect switches shall be kW-rated, quick-make, quick-break, with handle interlocked so that switch door cannot be opened unless switch is in de-energized position. Switches shall be heavy duty, having visible blade constructions and silver plated current carrying parts. Ratings and number of poles shall acc. to requirements. Provision shall be made for padlocking switch to "Off" position. Where no rating is shown, they shall be sized as per manufacturer's recommendations for the load of the circuit. All enclosures shall be dust-tight and corrosion-resistant, rated for site conditions.

Miscellaneous equipment

Control circuit relays shall be with dust tight enclosure where mounted individually. Relays shall be robust construction heavy duty for long life, silver to silver contacts and shall have contact arrangements, time delay and current rating to suit control requirements.

Individually mounted control stations shall be complete with dust-tight enclosure and shall have engraved laminated rigid plastic nameplate to designate services. Push buttons and selector switches shall be double break silver contact unitized type, have readily interchangeable operators, contact blocks and legend plates. Pilot lights shall be provided as required and shown on drawings. In finished areas control station shall be flush mounted. Starters shall be housed in industrial dust tight enclosures or grouped in motor control centres as shown. Starters for certain items of equipment will be provided as part of the equipment assembly, as identified in drawings and described in particular Specification section.

# 2.5.4 Switchboards, Sub-Panels and Sub-Main Distribution Boards2.5.4.1General

Distribution boards shall be factory assembled and confirm to relevant IEC Standard. Distribution boards shall be rated 400Va.c. services and current rating according to connected load including a reserve capacity of at least 30%. The main switchboard shall be constructed for safe, proper and reliable operation. The design and arrangement details of the equipment shall be to the approval of the Consultant. The switchboards shall consist of vertical sections joined together to form a free *standing cubiclised*, rigid, floor fixing assembly which is extendable at either ends. Each vertical section shall have built-in rollers for easy section *aligning* and jointing. The design and construction of the switchboard shall be indoor floor type distributor and be of the size, rating and arrangement in accordance with Particular Specification and be manufactured in accordance with Standards as given in the table below. The cabling wells shall be provided with separate gland plates

Cubicle covers shall be fitted with a hinged over, to shroud all live parts, and be secured by thumb screws.

Each board shall be fitted with a solid removable neutral link for isolation and an earth bar assembly, TN-C-S-Type of System shall be installed, if not specified or required differently.

The arrangement of the equipment within the assemblies shall be such as to afford maximum accessibility to all parts, incoming and outgoing cables and bust ducts.

The switchboard shall be equipped with fingerproof terminals for all incoming and outgoing connections. Terminals for signal and command circuits shall be separated from power circuits and clearly marked as such. Terminals for signals and commends shall be equipped with disconnecting links. Consider the following terminal-colouring:

- Phases L1, L2, L3: grey
- Neutral:Blue
- Earth:Green/Yellow
- Signals and command: grey

The distribution boards shall incorporate a fully rated, vertical, tin plated copper busbar structure onto which MCCB's can be plugged. The plugging of MCCB's will enable easy rearrangement and addition of branch circuits. Spare ways on the vertical stack shall be fitted with SP or TP blank plates. Minimum spare ways per board shall be 20%. All plug on MCCB'S shall be 230/400V a.c;50Hz to relevant IEC rating. A sample of the MCCB shall be submitted to the Consultant for approval. A fully directory frame shall be fixed to the inside of the door.

Panels suitable for	Low voltage power distribution		
	High current bus-bar distributior		
	• Control panel		
Material of frame and add-on	Sheet metal		
pieces			
Mounting boards	Galvanised and varnish coated steel plate≥2.5mm		
Protective coating of frame and	Printing colour		
add-on pieces	Powder coating		
Colour	RAL according to specifications; otherwise RAL7035		
Degree of protection	Min. IP 54 according to IEC 529		
Protection Class	1		
Protection against direct contact	Protection of all live parts against direct contact by insulation		
Protective Measures of installed electrical system	TN-C-S Type of System		
Nomial Voltage	According to nominal voltage of installed energy and control system		
Nominal insulation voltage	Ui = 1,000V		
AC testing voltage	3.5 kV		
Inside measurements	According to requirements incl. 20% reserve space per panel		
Mounting options for built-in devices	35mm standard size fixing bar		
Doors	Fixedon hinges; opening according to conditions in control room		
Door lock	Prepared for assembling with profile cylinder lock		
Cable entries	For all incoming and outgoing cables through cable glands and over strain relief clamps		

	Numbered terminal blocks			
Pedestal	Height in accordance to bending radius of cables and depth of			
Depot for drawings	One depot per panel door drawings DIN A4			
Eye-bolts	Four pieces per panel; only required for transport and installation at site			
Cable and wire routing	Separate cable ducts and routing of energy, control and extra low- voltage cables			
Air conditioning	Panel heater incl. hygrometer Ventilation unit with filter, controlled by a temperature control unit			
Panel lighting	One florescent lamp per panel; controlled by door positioning switch			
Protective measures	<ul> <li>Earthing of frame and all add-on parts</li> <li>Shock hazard protection of busbar, terminals and all electric components</li> </ul>			
Short circuit withstand	Proof according to IEC 439-1 for Mechanical and thermic short circuit withstand Nominal current and temperature rise at nominal load Power dissipation			
Bus bar	Material:E-CU; size according to requirements Shock hazard protection Rated-short-time current (ls) up to 50kA Rated peak withstand current (ls)up to 150kA Rated-short-time current of distribution bus-bar (ls) up to 30kA 3 or 5 conductor system (TN C			

	S-Type of System)
	• Bus bar shroud in accordance
	with VBG4
	<ul> <li>Protection against direct contact</li> </ul>
	• Type-tested to IEC 60 439-1, EN
	60439-1
Marking of electrical equipment	In accordance with IEC 750
Delivery to place of installation	Ready for connection

#### 2.5.4.2 Installations inside of switchboard, enclosures and distribution boxes

Wires. Cables and other devices such as fuses, relays, contactors, switches, terminals, etc. shall be marked accordingly. Terminals with universal foot for mounting on standard mounting rails shall be used for all ingoing and outgoing cables and wires. Installations inside the enclosure shall provide protection in accordance to IP32 or higher. The terminals shall be equipped with approved and suitable bridging material. End terminals shall be equipped with end plates. Phases, Neutral and Earth terminals shall be separated by partition plates for visual and electrical separation. The exact terminal dimension for the connected core shall be selected. Phase terminals shall be grey, terminals for Neutral shall be blue, terminals for Earth shall be green-yellow. All appliances such as terminals and fuses shall be mounted on mounting rails to EN 50 022. Terminals for signal and command circuits shall be separated from power circuits and clearly marked as such.

#### 2.5.4.3 Feeder for stand by generator

Any switchboard or distribution board with a connection to a stand by generator shall be designed acc. to the following specification:

Marked terminal block shall be provided for the generator's power and control cables. The main fuse for the incoming power supply from the generator shall be of type h.r.c fuse switch disconnector. On digital multi-function display shall be installed in the front door of the switchboard, indicating voltages and currents of all three phases and power actor. The system includes wiring and accessories such as transducer and fuses for measuring and control devices.

#### 2.5.5 Electrical Switchgear

# 2.5.5.1 Low Voltage HBC Fuse Switch Disconnector (single and three phase)

Standards: IEC/EN 60 947-3

Climatic proofing: Damp heat, constant t	o IEC 60 068-2-3.	Damp heat,
cyclical to IEC 60 068-2-30.	Ambient temperature: Min./M	Max25°C.

Altitude:up to 1300 masl.Mounting position: Vertical, horizontal.Overvoltage category: III.Pollution degree: 3.Degree of protection fromthe front: Operational state IP 20;front cover open IP10.Mechanicallifespan (operaions): 1.700.1.700.Instance

Rated operational voltage of contacts: 500/690V AC.Rated operationalcurrent:acc. to connected load.Rated frequency: 40-60Hz.conditional short circuit current AC: 50 kArmsRated insulation voltage ofcontacts: 750V AC.

## 2.5.5.2 Circuit breaker

Circuit breaker must be built and tested to IEC/EN 60947 and 0660.

The tripping characteristics of the circuit breaker must be in accordance with the operating characteristics of the connected application. All characteristics and standards must be guaranteed for the given altitude (m.a.s.l.) of the operating location.

Protective functions:

- 3-pole circuit breaker with protection characteristics of connected device (transformer, motor, etc)
- Short circuit protection
- Overload protection
- Earth-fault protection
- Differential indication of tripping due to overload, earth-fault or short circuit
- Main switch and isolation characteristics to IEC 947 and IEC 204
- Isolating characteristics including positive contact opening to IEC 204
- Isolating characteristics to IEC 408, over-dimensioned contact separation
- Quick-make, quick-break, irrespective of the actuating speed
- Clear indication of operating state
- Three switch positions: OFF / TRIPPED / ON
- Switching capacity independent of overload range, supply direction or enclosure

• Lifespan data valid without maintenance or changing of contracts, even as motor starter

- High tripping accuracy through long-term calibration
- Motor switching capacity AC-3 up to 660V to IEC 947
- Rated insulation voltage Ui = 1.000 V, insulation group C to VDE 0110
- Finger-and back-of hand proof to IEC 536
- Climatic proofing, Damp heat, constant, to IEC 60 068-2-3; damp heat, cyclic, to IEC60 068-2-30

• Rated uninterrupted current: in accordance with selected motor and frequency inverter

• Minimum rated switching capacity  $\geq 65 \text{ kA}$ 

- All circuit breaker shall be equipped with trip indicating auxiliary contacts
- Each breaker shall incorporate and electronic trip indicator on its front face.
- All MCCB's installed in main panels shall be fitted with auxiliary contacts for remote indication.
- •

## 2.5.5.3 Motor-Protective Circuit-Breaker and Motor Starter Combinations

General standard of Motor-Protective Circuit-Breaker and Motor-Starter Combinations to IEC EN 60 947. They must fulfill the requirements for main switches to IEC 204.

In general they fulfill overload and short-circuit protection. The overload releases have single-phasing sensitivity and are temperature compensated. The degree of protection – including terminals - must be IP 20 or higher. The protection against electric shock to IEC 536 is finger- and back-of-hand proof.

The trip block must contain a temperature compensation range of Min./Max.

 $-5/+40^{\circ}$ C. The operating range must lay between  $-25/+50^{\circ}$ C.

All motor-Protective Circuit-Breaker and Motor-Starter Combination must fulfill Coordination type "2" to IEC/EN 60 947-4-1:

- No risk to persons or installations
- Starter is capable of renewed operations
- No damage to the starter with the exception of a slight welding of the contacts, provided they can be separated without significant deformation. The selection of the Motor-Protective Device shall be in accordance with the operating characteristics of the connected application. All characteristics and standards must be guaranteed for the given altitude (m.a.s.l.) of the operating location. The following standards are obligatory:

Motor switching capacity ...AC-3"

- Nominal operation voltage: adapted to connected device
- Rated short circuit breaking capacity: 100kA
- Instantaneous magnetic trip
- Type of protection: IP 20 or higher
- Incl. standard auxiliary contacts with one make contact and one break contact
- •

# 2.5.5.4 Meter

## a) <u>General</u>

The Contractor is responsible for calibration, sealing and inspection according to instructions of the responsible Electricity Utility. Meters shall be supplied and installed ready for operation. All cost are to be included under item "Metering".

kWh-and kVarh-meters shall be supplied and installed according to the following specification, it not specified differently by the responsible Local Electricity Utility. In any case the Contractor shall get approval for the type of meter from the Local Electricity Utility in advance.

- b) <u>Specification for kWh-meter:</u>
- Three phase, four wire
- For unbalanced load
- Nominal voltage: 230/400V, 50Hz
- Class 2 (if no higher class specified by Electricity Utility: e.g. class 1)
- Protection IP 40

## C)Specification for kVarh-meter

- Three phase, four wire
- For unbalanced load
- Nominal voltage: 230/400 V, 50 Hz
- Class 2 (if no higher class specified by Electricity Utility, e.g. class 1)
- Protection IP 40
- d) <u>KWh-transducer metering</u>

Provide transducer including preliminary works and terminals with test and disconnection function. Accuracy of transducer shall be to requirements of Local Electricity Utility.

## 2.5.5.5 Mains protection of equipment

Supply and install a co-ordinated lightning and surge protective system for power supply. signal and control circuits. The contractor shall provide a concept for approval prior to supply. Consider installed Type of System (E.G. tn-c-s). Supply a modular system of one manufacturer only. The provided system shall consist of harmonized lightning current arresters, which are responsible for the conducing of high energies without damage, and surge arrester protecting the terminal equipment. Lightning current arresters have to be installed as close as possible to the service entrance of the electrical system and surge arresters as close as possible o the equipment to be protected.

For the power supply, the potential short-circuit currents have to be especially taken into consideration. The lightning current arrester must safely disconnect prospective short-circuit currents of up to 25 kA and protect the employed back-up fuses against damage at the same time.

## a) <u>Lightning arrester Class B</u>

**Class B** arrester for the integration of power lines in lightning protection

equipotential bonding systems. For the protection of low voltage consumer's installations against surges, even at direct lightning strikes. Applicable for the protection of installations and equipment of Overcharge Categories 1 to IV in accordance with DIN VDE 0110-1:1997-04. Tested

with lightning currents (10/350) in accordance with DIN V ENV 61024-1 (VDE V 0185 Part 100), DIN VDE 0185 Part 103, SPD Class 1 according to IEC 61643-1:1997-02. SPD type 1 according to EN 61643-11:2001. Arrester according to E DIN VDE 0675-6:1989-11, - 6/A1:1996-03 and - 6/A2:1996-10.

- Encapsulated, non-exhausting creepage discharge spark gap
- Energy-coordinated with surge arrester, Class II and III directly with terminal units in Overvoltage Category 1 at UN=230V ac.
- Low voltage protection level
- Terminal for conductors and bus bars
- Nominal voltage: 230/400V AC
- Protection type to IEC 529/EN 60529:IP :20

b) Surge arrester Class C

**Class C** surge arresters for the use in the Lightning Protection Zones Concept at the boundaries of LPZ OB -1 and more. For the protection of low voltage consumer's installations against surges (Overvoltage Category

III according to EN 611643-11:2001. Arrester according to E DIN VDE 0675-6:1989-11 and -6/A1:1996-03.

- Energy coordination possible with upstream lightning current arresters
- High discharge capacity
- Fault indication by mark in the inspection window
- Terminals for conductors and bus bars
- Nominal voltage: 230/400V AC
- Temperature range:  $-25^{\circ}$ C up to  $+75^{\circ}$ C
- Protection type to IEC 529/EN 60529 : IP 20.

# 2.5.5.6 Main Switch

Function: main rotary switch, It is used as On-OFF switch to connect/disconnect all three phases of the main power supply. The switch is dimensional according to the actual nominal power of the connected installations including a reserve capacity of at least 50%, Nominal voltage is 230/400V. The main switch is equipped with a front plate showing clearly the positions ON and OFF. Protection against electrict shock to IEC 536: Finger and bask-of-hand proof, Degree of protection shall be IP 65.

## 2.5.5.7 Miniature circuit breaker

- Characteristics: B or C acc. to requirements
- Standard: IEC/EN 60 898
- Protection against electric shock to IEC 536: Finger and back-of-hand proof
- Degree of protection (terminal): IP20
- Switching capacity to IEC/EN 60 898: 10kA

- Nominal voltage of single phase mcb: 230 V ac
- Nominal voltage of three phase mcb: 230/400 V ac
- 2.5.5.8 Residual current device
- Standard: IEC?EN 61 008
- Protection against electric shock to IEC 536: Finger and back-of-hand proof
- Degree of protection(terminals): IP40
- Ambient temperature: Min./Max.:  $-25^{\circ}C +40^{\circ}C$
- Rated operational voltage : 230/400 V ac
- Rated uninterrupted current : acc. to requirements
- Rated fault current: 0.03 A for installations in damp environment,

bathrooms, private rooms and kitchen.

- Tripping time : 200ms
- 20.5.5.9 Compact starter

The reversing compact starters shall protect the motors against phase failure, overload and in the event of a short circuit. Preferably a tool-less plug connection consisting of motor-protective circuit-breaker and contactors shall be provided. Both of the switchgear devices are mechanically interconnected via a plug-in connection element. The compact starters must be equipped with the required manual and an automatic operation mode shall be provided. Reversing functions are to be provided according to requirements (e.g. to open and close valves). Provide wiring and accessories accordingly.

• Equipped with one motor protection switch and one switching capacity contactor

- Coordination ..2"
- Rated operational current according to nominal data of connected motor
- Motor switching capacity .. AC-3"
- Short-circuit release
- Overload release, adjustable
- Single-phasing sensitive
- Nominal operation voltage: in accordance with connected device
- Rated short circuit breaking capacity : 100kA
- Instantaneous magnetic trip
- Adjustable overload release
- Type of protection: IP 20 or higher
- Incl. standard auxiliary contact with one make contact and one break contact
- Incl. trip indicator providing differential indication of short circuit and overload
- Standard auxiliary contacts for ON/OFF position

## 2.5.5.9 Soft Starter (Low voltage)

Soft starter shall be of one manufacturer only and of identical type and size as far as practically possible. Soft starter are used for controlled start up and stop of motors, especially of pumps. Nominal data shall be acc. to characteristics and nominal data of connected device.

Soft starter shall be of one manufacturer only and of identical type and size as far as practically possible. Soft starter are used for controlled start up and stop of motors, especially of pumps. Nominal data shall be acc. to characteristics and nominal data of connected device.

Each pump unit respectively the soft starter shall be equipped with a shaft power monitoring device. It shall provide preventive action by initiating a warning or stopping before the pump runs dry or in case a pipe is blocked respectively a valve is closed.

Each pump unit respectively the soft starter shall be equipped with a torque control. It shall provide constant acceleration rate, independent of motor load, significant lower start current compared to soft starters without torque control, torque control of acceleration and deceleration ramps. It shall maintain constant accelerating and decelerating torque. The entered torque ramp time enables to generate a desired motor torque. The motor torque shall be no longer dependent on an applied motor voltage and the speed torque characteristics of the motor, but is increased according to the timed ramp.

- Suitable for particular field of application
- Shaft power monitoring
- Torque control
- Current limitation
- High overload withstand capability
- All parameters individually adjustable
- Keypad with plain text display
- Mains supply voltage: nominal voltage +/-10%
- Standards: IEC/EN 60947-4-2
- Degree of protection. IP 20
- Approvals: UL,cUL
- Suppression of closing transients
- Overhead monitoring
- Underload monitoring
- Thermistor input
- Faulty memory

• Pre-programmed parameter sets: at least three different standard applications

• Suppression of DC components on motors

- Potential isolation between power section and control section
- Interface: according to particular specification
- Filter for reduction of voltage peaks, capacitive currents, bearing currents and EMV-emission acc, to manufacturer recommendations and instructions
- Ambient temperature:  $0...+50^{\circ}C$
- Relative humidity: according to tropical operation conditions, minimum 95%
- Climatic proofing to IEC 60 068-2-3
- EMC compliant operation
- Enclosed cabinet for indoor installation
- Potential isolated control terminals
- Electrical isolation between power and control sections
- Protection provided against under-/overvoltage, overcurrent and phase failure, if no separate motor protective relays is being installed.

## 2.5.5.10 Single-phase control transformer

- Use: Power supply for control circuits
- Type: Single phase control transformer
- Nominal primary voltage: nominal voltage ±5%
- Nominal secondary voltage: nominal voltage±5%
- Standard in accordance to EN 60 989

## 2.5.5.11 Digital display

- Type: surface mounted in front door of switchboard
- Display:  $\geq 10 \text{ mm}; 3 \frac{1}{2}\text{-digits}$
- Input: in accordance with signals from connected devices
- Accuracy: 0.1%

## 2.5.5.12 Voltage meter

- For surface installation in front door of switchboard panel
- Range: 0-400 V A C
- Linear scale 90<sup>o</sup>
- Class 1.5

## 2.5.5.13 Actuators and selector switches

## a) <u>General</u>

Supply industrial switching devices such as selector switches, push-buttons, key operated actuators, indicator lights, etc. confirming to EN 60 947. The devices shall be of degree of protection IP 65 and wear-resistant. Supply only standard installation diameter 22.1 mm.

• Type: for surface mounting

- Colour of indicator lights: in accordance with IEC 73
- Contact elements with at least two contacts
- Standards in accordance to IEC /EN 60 947
- Nominal operation voltage: 230V a.c.
- Climatic proofing: in accordance to IEC 60 068-2-3
- Ambient air temperature:  $\geq -25 / +60^{\circ}$ C
- Suitable for use with electronic devices
- b) <u>Key operated actuators</u>
- Two key-position with stay put / spring return function and removable
- Stay put / spring return function and removable
- Nominal operation voltage: 24V DC
- Supply including three keys per actuator
- c) <u>Emergency-stop actuator</u>
- Type: for surface mounting
- Plunger red, body yellow
- Snap action and positive non-leave action
- After actuation, plunger remains in the actuated position, pull to release
- Contact elements with at least two contacts
- Type of protection: IP 65
- Nominal operation voltage: 230V a.c.

## 2.5.5.14 Horn – alarm siren

- Degree of protection: ≥IP 54
- For on surface installation
- Nominal voltage 230V a.c
- 90-100 dB

## 2.5.5.15 Hydrostatic level measurement

- Measuring of hydrostatic pressure of water
- Measuring range according to requirements
- Permanent hermetically sealed cable probe
- Meeting all required approvals fo drinking water
- Protection:  $\geq$ IP65
- High-precision and long-term stability measuring sensor
- Integrated overvoltage protection devices
- 4-20 mA output signal for hydrostatic pressure measured value
- Accuracy: Linearity including hysteresis and repeatability as per DIN EN 60770: +/- 0.2% of full scale

• Thermal change in zero signal and output span for the typical temperature range  $0^{\circ}C - 30^{\circ}C$ : +/-0.6%

• Minimum ambient temperature range:  $-10^{\circ}C....+50^{\circ}C$ 

- Electromagnetic compatibility (EMC): Interference emission to EN 61326
- Interference immunity to EN 61326 for industrial range
- Integrated overvoltage protection to EN 61000-4-5≥1.2kV
- Screened cable, long-term withstanding the environmental conditions;
- approved for the use with the specified water level probe
- Protective tube for probe and signal cable
- Only one cable connection via terminals between level probe and new switchboard inside terminal housing IP66
- Approval of all relevant CE directives
- Standard DIN EN 60770 (IEC 60770): Transmitter for use in industrial environment
- Installation, setting and operation manual in English language

## 2.5.5.16 Floating Switch

• Level switch suitable and approved for installation and function according to requirements

- Function: Control of maximum water level in water chambers
- Equipped with one micro switch with one change over contact, 3 wire
- Two switching points with different upper and lower switching angles
- Switching capacity up to 150V DC
- Approval of all relevant CE directives

• Minimum ambient temperature range:  $-20^{\circ}C$  (use appropriate cable material)

• Only one cable connection via terminals between level probe and new switchboard inside a terminal housing IP66

• Installation-, setting- and operation manual in Bosnian and English language

## 2.5.5.17 Isolating amplifier

• Use: galvanic isolation and signal processing of the analogue standard signal from the Hydrostatic Water Level Indicator 4 - 20 mA

- Burden: PLC-input and electronic display for water level indication
- Channels according to particular requirements
- Installation according to manufacturer`s instructions
- Contactor for power circuits
- Standards: IEC 947
- Climatic proofing: Damp heat, constant and cyclic, to IEC 68
- Protection: Finger and back-of-hand proof
- Equipped with suppressors
- Rated operational voltage: standard 230/400V a,c,, if not specified differently in Part Spec.
- Incl. standard auxiliary contact with one make contact and one brake contact

• Rating date: in accordance with requirements of connected device

## 2.5.5.18 Tableau for fault indication

- Use: Indication of faults
- Industrial Standard
- Surface mounted in door of switchboard cabinet
- Equipped with red LED's for fault indication
- Reset-device for acoustic alarm
- Aggregate fault report
- Push button for reset of faults and for lamp function test

## 2.5.5.19 Analogue measuring instruments

- Analogue instruments shall be designed for installation in the front door of switchboard cabinets
- Class 1.5
- Quadratic size NW 72 or NW 96 (according to requirements of Client)
- Scale 90<sup>o</sup>
- Protection class  $\geq$ IP 55

## 2.5.5.20 Operation time counter

The counter shall be used for counting of operation hours. Designed for front mounting in front door of sub-panel. Protection class  $\geq$ IP 55. Operation hours counter may alternatively be an application of the control relays.

## 2.5.5.21 Meter Protective relalys

The motor protective relays shall be of type "Thermal Overload Relay" or, if the motor is equipped with thermistors (e.g.) fan motor), of type Thermistor Overload Relay".

The relays shall be ambient temperature compensated and provided overload and short-circuit protection. They shall be of type "2" coordination. Tripping characteristics and setting range of the overload release shall be according to the connected type and size of motor. The relays must also supply comprehensive protection for the connected motor in coordination with circuit breaker and frequency inverter. Single phasing monitoring and protection shall be provided by the motor protective relay or a separate protection device. All types of motor protective relays shall he to IEC/EN 60 947, VDE 0660. Climatic proofing shall be to damp heat, constant, to IEC to 60 068-2-3 and damp heat, cyclical, to IEC 60 068-2-30. Ambient temperature from  $-25^{\circ}$ C to  $+60^{\circ}$ C open and  $-25^{\circ}$ C to  $+45^{\circ}$ C enclosed. Protection against direct contact from front shall be to IEC 536 finger and back hand proof. All motor protective relays shall be equipped with

auxiliary contacts. They shall indicate fault and position of the main contacts. Thermistor trip shall always be indicated separate from other faults.

Additional protective functions for motors with a nominal power of more than 2kW:

- Under and Overvoltage protection for all phases
- Phase loss protection
- Locked rotor/stall protection
- All protective functions with alarm and trip

## 2.5.5.22 PTC – Thermistor Relay

- Suitable for the connection of selected PTC sensors
- Selector switch without automatic reset
- Manual resetting
- Test button
- Zero voltage proof
- Tripping also in the event of a short circuit in the sensor
- Mains and fault LED display

## 2.5.5.23 Mains decoupling relay

The mains decoupling relay is used for independent 3-phase voltage and frequency supervision of the power supply from the public grid. The relay is used for the control system of the Stand By Generator.

Required design standards are IEC 255-4: BS 142:VDE 0160. If the measuring voltage drops below 70% Un, supervision of the frequency is blocked. The relay must be equipped with a test push button for test tripping of the unit. Switching hysteresis can be set to the required value for the proposed use.

• Rated Frequency range of measuring input circuit: nominal frequency (50Hz)  $\pm 20\%$ 

- Minimum response time: 50ms
- Two output relays; one changeover contact for each trip relay
- Temperature range:  $-25^{\circ}$ C to  $+50^{\circ}$ C
- Constant climate class F according to IEC 68: more than 56 days at  $40^{\circ}$ C and 95% relative humidity
- Electrical fast transient acc. to IEC 801: 4kV/2.5kHz, 15ms
- Repeat accuracy: 1% <sup>o</sup>C

## 2.5.5.24 Programmable Control Relay

The relay shall provide electronic "wiring" by keystroke. It shall be equipped with an LCD(minimum 4 lines of 12 characters) ad a keypad. In parallel programming via software from PC shall be enabled. The relay shall provide a zero-voltage safe internal and external circuit configuration storage in EEPROM memory.

Moreover the relay shall provide the following features and standards:

- Temperature range -2 °C to+55 °C
- Integral password protection for circuit configuration and relay value presets
- Current flow display for circuit configuration testing
- Selection option from at least the following languages: English,

German, French

- Integrated timing relays , including delay functions
- Integrated up and down counter relays
- Integrated timers
- Integrated analogue value comparators
- Separate or integrated LCD display
- At least 16 auxiliary relays
- Integrated interface for network connection with other relays of same type
- Integrated interface for connection to a PC
- Degree of protection  $\geq$ IP 20
- Accuracy of toming relays +/\_1%
- Resolution in range "seconds": 10 ms
- Resolution of analogue and digital signals: 0:1V
- Bit resolution: 10
- Accuracy of actual value: +/- 2%

## 2.5.5.25 24V DC Power Supply Unit

- Type : compact primary switched-mode power supply unit
- Approved for industrial use
- Suitable for supplying power to electrical and electronic components as to be provided and operated
- Installation on 35mm mounting rail inside of enclosures and switchboards
- Input voltage : 230 V AC
- Permitted voltage operation range: 187-264V AC
- Frequency range: 47 to 63 Hz
- Equipped with one input fuse
- Input and output equipped with surge voltage proection (e.g varistor)
- Nominal output voltage;24 V DC
- Tolerance : +/- 3%

- Nominal output voltage : 24V DC
- Tolerance : +/-3%
- Nominal output current: according to conneted load including reserve capacity of 30%
- Function display via LED
- Efficiency >85%
- Limiting of line current harmonies to EN 61000-3-2
- Ambient operation temperature :  $0^{\circ}$  C.....+45  $^{\circ}$ C
- Permitted humidity: up to 95% at 25°C
- Electrical safety acc.to EN60950/VDE 0805
- Electromagnetic compatibility (EMC): in conformance with EMC directive 89/336/EEC
- Emitted interference: EN50 081-1
- Type of protection  $\geq$ IP 20
- Class of protection: I
- MTBF > 500 000 hours

# 2.5.5.26 Data logger

- Accuracy : +/- 1%
- Power supply: 24 V DC
- Minimum four analogue 4-20 mA inputs
- Minimum eight digital common point inputs
- Memory capacity: >60.000 readings
- Recording interval: 1 second to 60 minutes (on configuration)
- Starting recording on programmed date and time
- Stop on memory full of alternatively overwrite oldest records
- Possible to download while still recording
- Real time clock
- Interface of PC(USB and/or RS 232)
- Ambient operation temperature :  $-20^{\circ}C$ .....+  $50^{\circ}C$
- Software for configuration and data evaluation in English and suitable
- for PC with windows XP Operating system
- Graphical display
- Statistical calculations
- Export of the data to EXCEL and/or LOTUS
- •

# 2.5.5.27 Axial fans

- Cased axial fans, cylindrical duct; for direct in-line installation in ducting
- Casing made of galvanizes steel
- IP 55 terminal box on outer casing

- Suitable for air flow temperature from  $-40^{\circ}$  C to  $60^{\circ}$  C
- Protection against accidental contact to VDE 0700 and EN 294
- Air flow direction: pulling air over the motor
- The fan shall be equipped with anti vibration mounts and flexible connectors. Vibration transmission to building and technical equipment must be avoided
- Motor protection to IP55
- Motor standards to IEC 2J and IEC 61
- Motor casing made of aluminium or cast iron, totally enclosed with cooling fins
- Motor bearings maintenance free (sealed for life) and dust proof
- Full immersion, tropical moisture protection to motor windings, insulations class F
- Motor equipped with thermal contacts
- If condensation is to be expected, the fan must be installed with condensation pores facing downwards and must be open

• Fans must be equipped with guards, made of spot welded zinc plated wire mesh

## 2.5.6 Power factor compensation

The power factor compensation unit shall be of industrial standards. It shall compensate the reactive electrical energy used by the inductive receivers in order to reach a cos phi>0,90. The unit shall be build in one separate panel of the switchboard. It shall be dimensioned exactly according to requirements and provide as follows:

• Reactor-protected automatic capacitor banks in compact design, encapsulated for switchboard mounting , 230-690 V, 50/60Hz

- Contactors for leading load
- Three phase condensers
- Overload protection unit
- Timer-regulator of adjusting stages with sufficient steps( minimum 4 steps) Collector bar system for reactive currents
- Main switch
- •

# 2.5.7 Multi actuators for OPEN-CLOSE duty

- Notice also technical specification for mechanical equipment
- Type of duty: short time S2-15 min
- Output speeds according to particular requirements (e.g of 4 to 180 rpm and 50Hz supply)

• 3-ph AC motor in insulation class F, with motor protection by three thermoswitches placed in the windings

- Counter gear limit switching for end positions CLOSED/OPEN
- Tripping torque for closing /opening direction adjustable at calibrated torque dial and directly readable in daNm
- Anti-condesation heater in switch compartment
- Precision potentiometer with reduction gearing for positin monitoring
- Handwheel for manual operation, which does not rotate during motor operation
- Valve attachment according to ISO5210
- Connection actuator controls via plug/socket connectors
- Reversing contactors mechanically and electrically interlocked
- Four inputs OPEN-STOP-CLOSE-EMERGENCY galvanically isolated via opto-isolators
- Relays for output signals, freely programmable
- Programmable emergency operation function
- Galvanically isolated position feedback signal 0/4....20 m A
- Electronic name plate and logging of operating data
- Controls/ local controls can be positioned as every  $90^0$
- Permissible ambient temperature  $-25^{\circ}$ C to  $+70^{\circ}$ C, enclosure protection

IP 67, corrosion protection KN( Suitable for atmosphere with low level of pollution)

• Finish coating: two component iron –mica combination, colour: silver-grey( similar to RAL 9007)

## 2.5.8 Lighting

## 2.5.8.1 Indoor lighting

• Twin –lamp moisture proof diff.luminary

For all indoor and outdoor applications without exposure to chemicals luminaries acc.to the following specification shall be selected.

- Moisture proof diffuser luminary (e.g 2 x 58W or 1 x58 W)
- Duo circuit
- Type of protection IP 65
- For T26, low –loss conventional ballast
- Housing made of unbreakable polycarbonate
- One piece diffuser made of polycarbonate with internal prismatic structure
- Reflector made of galvanized sheet steel, painted in white
- Through wiring using standard cable shall be possible
- 5 pole push in terminal
- Installed on ceiling, wall or trunking. Can also be suspended on chain using chain suspension brackets.

For applications involving exposure to chemical as well as moisture luminaries acc.to the following specification shall be selected

- Moisture proof diffuser luminaries 2 x 58W or 1 x 58W
- Duo circuit
- For T26, low loss conventional ballast
- Rugged diffuser in conjunction with stainless steel catches shall be used
- Type of protection IP 65
- Housing made if halogen free glass fibre reinforced polyester
- Non-ageing polyurethane foam seal
- Diffuser made of either PMMA or PC with internal prismatic structure
- Installed directly on ceiling or mounting track
- Can be installed on trunking
- Luminary consists of roll formed reflectors made of galvanized sheet steel, painted in white, can be hinged
- Reflector made of white glass fiber reinforced polyester
- 5 pole push in terminal
- Heat stability with PM  $650^{\circ}$ C with PC  $850^{\circ}$ C

## Louvre luminaries

Surface mounted luminary for individual and continuous row installation Use this type of luminaries in dry and continuous clean rooms only

Surface mounted luminaries with matt and semi-matt optic 2 x 58W, duo circuit, for T 26, with low loss conventional ballast. Surface mounted housing made sheet steel white stove-enamelled, with plasma welded edges. Bivergent reflectors optic made of matt anodized pure aluminium with transverse vanes curved in V shaped, incl. optic; glare limitation L<1000cd/m<sup>2</sup> at 65<sup>0</sup>C. Wired ready to connect.

- Lamp flux: 5200lm
- Colour rendering index: 1B
- Connected load: 134W, Lambda0.99
- Compensation: D
- Type of protection IP20

Surface mounted luminary with prismatic diffuser

Diffuser luminary for individual installation with prismatic controller, for T 26, with loe-loss conventional ballast. Made of sectional sheet steel, whote stove enameled. Single piece diffuser, extruded, in transparent PMMA with prismatic structure for precise direction of light.

Round transparent diffuser luminary

Transparent diffuser luminary, round; protection  $\geq$  IP 65; with high frequency ballast; round housing made clear unbreakable transparent polycarbonate UV stabilized with internal prisms, translucent whire reflector; 850<sup>°</sup>C glow wire tested lamp flux  $\geq$ 4000lm;

Emergency luminary
Ceiling mounted emergency luminary with separate battery; in non-maintained mode, without monitoring, with T16 8 watt with 410lm. The light emitted from the underside of the luminaries provides improved escape route illumination. Polycarbonate housing. Minimum recognition range 25m; test key integrated in housing; electronic ballast with integral emergency lighting control unit; hot start; deep discharge protection; reclosing interlock; NiMH battery; voltage : individual battery supply 220/240C AC(local). Temperature range  $-5^{0}$ C up to  $+ 35^{0}$ C. Luminaries and cover comply with EN 60598-2-22, DIN 4844, EN 1838, VDE 0108. Minimum dimensions; 300mm x50mm x 70 mm. protection type: IP 40. Protections class:SC2

## 2.5.8.2 Outdoor lighting

## a) Road Lighting luminaries

services friendly fluorescent road lighting luminaries. Sealed construction resistant to weather and impact, vandal resistant polycarbonate refractor bowl. Mounting – module in non-corrosive, die cast aluminum. Degree of protection IP 65. Luminaries shall be designed for lamps accoridning to particular specification Starting time of fluorescent lamps shall be maximum one second. From manufacturers guaranteed average lamp life shall be minimum 10,000 hours. Lamp shall be accordance with IEC 968 and 969.

## b.) Lighting poles

steel poles, pot-galvanized inside and outside. Construction in accordance with EN 402. Provided with earth connection screw or strap and cable inlet. Poles can be one with arm or separately equipped with arms for luminaries.

## c.) Pole arms

# Pole arms to be mounted separately on the pole shall be in accordance with the design as shown in the drawing. The arms shall be made of steel, pot-galvanized inside and outside. Construction in accordance with EN40/2.

## Standard gradient of 15<sup>o</sup> if not differently required by luminaries. Screws made of stainless steel. <u>d.</u>) Fluorescent lamps

staring time of fluorescent lamps shall be maximum one second. From manufacturers guaranteed average clear tubular outer bulb. Monochromatic yellow colour with non-existent colour rendering.

e.) Low pressure sodium vapour lamp SOX-E

Low pressure sodium vapour lamp with a U-shaped discharge tube containing sodium, enclosed in a vacuum clear tubular outer bulb. Monochromatic yelloe colour with non-existent colour rendering.

## f.) Twilight switch

in weatherproof casing IP 54; With threaded joint; nominal operation voltage 230V a.c switching capacity 10A/230V a.c adjustable illumination: ON at appr.10 1X/OFF at appr. 501x.

switching of outdoor lighting shall be optional manually by off switch and/or automatically by dimmer switch. Installation of dimmer switch on appropriate location outside of Operation Building.

g.) Cabling of lighting poles

The electric circuits of the outdoor lighting shall either be connected to the Main Switchboard in the pumping Building or to the Sub-panel in the new service building. Install a suitable fuse in the switch board.

The shorest possible way for the cable trenched shall be preferred. Co-ordinate the line of the cable trenches with pipe trenches.

Before execution of works the Contractor shall fix the exact trench line in cooperation with the Engineer and the Employer and measure the exact cable length required.

The lighting poles shall be connected with a cable type N-YY. Between the poles cable shall be installed in one unot. No cable joints or terminal boxes are permitted.

Power and control cables shall be installed throughout in separate protective cable, conduits. Notice General Specification for cable trench.

Inside the cable trench cable cover plates shall protect cable and cable conduit. The Contractor shall supply and install these plates in accordance with effective Specification s and Standards.

A galvanized round earthing wire 10mm<sup>2</sup> shall be laid in each trench in the sand under the cable cover plates. The wires shall be connected ti the earth screws and/or straps of the lighting poles and one end to a Local Equipotential/Bonding Bar inside a building.

Latest one day after cable installation in the trench as insulation test of all cores to each other and to earth and resistance measurement of all cores shall be made. The cores shall be marked. The tests shall be executed with right instruments and in accordance with relevant Standards. A protocol shall be issued and handed over to the Engineer. The protocol contains a description of the test method, the test results (measured data), time and date of test, name and signature of the contractor.

## 2.5.9 Mobile Measuring Instruments

## 2.5.9.1 Multimeter

- True RMS measurements
- 0.7% basic accuracy
- 6000 count resolution
- Digital display with analog bargraph
- AC/DC current measurements
- Backlight display
- Manual and automatic ranging
- Display Hold
- Frequency and capacitance measurements

- Resistance, continuity abd diode measurements
- Min-max average recording
- Easy battery exchange without opeining the case
- Compact case with separate holster
- EN61010-CAT III 600V
- Three year warranty
- Safety conformance: All inputs are protected to IEN61010-1 CAT

III 600V. UL, CSA TUV listed and VDE Pending

- Voltage AC: Max. Resolution 1 mV, Maximum 600V
- Current AC: Accuracy\*  $\pm(1.5\% + 3)$ , Maximum 10 A, Max.

Resolution 10Ma

- Resistance: Accuracy \*±(0.9% +1) Max. Resolution 0.1, Maximum 40M
- Frequency: Accurancy\* $\pm$ (0.1% +2). Max. Resolution 0.01 Hz
- Operating temperature:  $-10^{\circ}$ C to  $+50^{\circ}$ C

Note: Last calibration shall be made no more than 6 months before. Provide a certificate from the manufacturer with approval of calibration.

## 2.5.9.2 Thermal imager

Fully radiometric infrared camera for thermal check of electrical installation, electromechanical equipment, process equipment and HVAC/R equipment

- Infrared and visual (visible light)images
- Optimized for field use in harsh work environments
- Tested ti withstand a 2m (6.5ft) drop
- Withstands dust and water- tested to an IP54 rating
- Spatial resolution: 2.5 mrad
- Min focus distance : 15cm
- Thermal sensitivy:  $<0.2^{\circ}$ C at  $30^{\circ}$ C
- Focus: manual
- Minimum focus distance : 50 cm
- Om camera operating modes: full picture in picture and full screen IR
- Temperature range:  $10^{0}$ C to  $+ 250^{0}$ C
- Accuracy:  $+/-5^{0}$ C or 5%

## 2.5.9.3 Three phase induction motor (pump motor)

## 2.5.9.3.1 Standards

All electrical motors shall comply in general with the latest IEC and EN Standards, in particular with

Electrical Standards

- IEC/EN 60034-1
- IEC/EN 60034-2
- IEC 60034-8

## • IEC 60034-12

Designation system concerning methods of cooling refers to standard IEC 60034-6. For IP code classification of degree of protection provided by enclosures of rotating machines refer to Standard IEC 60034-5 or EN 60529

IEC/EN 60034-5/6/7/9

## IEC 60034-15

## Balancing

Vibration acc.to Grade A (IEC 60034-14).

All electric motors shall be certified to ISO 9001 international quality standard Only absolutely new and factory tested motors shall be supplied

All new motors for pumps shall be of the same manufacturer. Insert manufacturers data in corresponding data sheet

All electrical motors shall be fitted with a transport lock to prevent damage to the bearing due to vibration during transport

All motors shall be delivered with bearing grease for use at temperatures as usual for tropical climate (humid environments) and lubricated for ambient temperature  $50^{0}$ C

Lubrication intervals and grease quantities shall be specified on a plate on the motors as well as in the manual supplied with motor.

The following documentation shall be supplied for each type of motor

- Test confirmation
- Type test report
- Routine test report
- Torque/speed curve

## Type of bearing

Anti-friction bearing with lubricator; D-end; grooved ball bearing; N-end : preloaded grooved ball bearing; in case of particular high radial loads motors shall be provided with cylindrical roller bearing at the D-end.

Bearing re-greasing: Grease

nipples. Shaft seals

Shaft seals shall be maintenance free; they shall protect the bearings reliably against the ingrees of dust and spray water to degree of protection IP 55; minimum standard: shaft seals with felt ring on the bearing inside, outside a labyrinth seal. <u>Paint system</u>

For long term protection; to be chosen in accordance with sire conditions to meet the requirements of climate, groups worldwide to DIN IEC 721; resistant to light and temperatures up to  $120^{0}$ C, non-porous an resistant to impact abrasion.

Painting aluminium stator: two –pack epoxy paint, thickness  $\geq$ 70µm

Painting cast iron stator: Two-pack Acid Polyurethane Lacquer Enamel, thickness >60µm

Three phase induction motors	Obligatory standard specification	
Type of motor	Totally enclosed squirrel cage induction	
	motor	
Material specification for	Stator frameworj, bearing shields, feet,	
aluminium motors	terminal box made of extra corrosion	
	resistant aluminium alloy	
Duty	SI (Continuous duty)	
Cooling system	Standard cooling according to IC411	
Rated voltage for rated power	Minimum rated voltage 690V	
above 90kw		
Frequency	50 Hz	
Degree of protection	Minimum standard IP 55	
Design	Reinforced tropicalisation	
Altitude	1,000 masl	
Environmental conditions	Tropical climate	
Special equipment	Drain holes	
Non-sparking	To IEC79-15	
Impulse withstand level of	Above minimum 4Xu <sub>N</sub> +5Kv	
windings		
Terminal box	Box shifted subsequently from left to right or	
	vice versa, even at site; Equipped with	
	openings for cable glands	
Terminal block	Terminals for connection of Cu-cables	
Motor mounting arrangements	Acc.to pump requirements	
(M)		
Eartihng device	External earthing bolt. Earthing screw for	
	connection of external protective earth	
Heating device	Heating element 230V	
Core	Corrosion protected stator and rotor core	

## 2.5.10 Auto transformer

These general specifications refer to auto transformer means electrical transformer with only one winding. The single coil has one or more extra taps or electrical connections in various positions along the winding. Each tap corresponds to a different voltage so that effectively a portion of the same inductor acts as part of both the primary and secondary winding. In some rural applications deliberate –incorrect voltage may occasionally appear. The autotransformer shall be used to provide a slight boost( or step-up) to correct an undervoltage condition or buck (step-down) to correct an overvoltage condition. Automatic voltage regulations function in not applied.

The contractor investigates within the frame of the detail planning if "zig zag" autotransformer are being required to provide grounding (earthing) on three phase systems that otherwise have no connection to ground (earth). A "zig zag"-transformer provides a path for current that is common to all three phases ( so called " zero sequence" current ).

In general each starter shall be dimensioned to start the connected pump motor respectively the strongest of all pump motors connected. The cubicle shall be a free standing version arranged with access doors in front.

- Protection  $\geq$ IP 23
- Ambient temperature:  $50^{\circ}C$
- Cable inlet: according to particular requirements
- Starter functions: start procedure, interlocking
- Termistor protection Relay for start- transformer
- Minimum 4 starts each hour

## 2.5.11 Transformers

The transformer to be supplied and installed as part of this contract shall be according to the following general specification. All transformers must be suitable for the climate and site conditions prevailing at the location of installation.

It is the responsibility of the contractor to check the existing transformer sheds, houses, base plates or similar regarding their suitability to install new and bigger equipment. If required, the contractor has to modify the existing structures at this own costs to fit the equipment he intents to install.

Type of transformer	Three phase oil cooled transformer	
	with expansion tank or hermetic type	
Oil	PCB- free insulation oil	
Standards	Latest IEC	
Nominal power	According to Part. Spec.	
Primary voltage	According to Part. Spec.	
Secondary voltage	According to Part. Spec.	
Taps (±)	$\pm 2.5\%, \pm 5\%$	
Routine tests acc.	To IEC Standards	
Type and special tests acc.	To IEC standards	
Dial type thermometer	1 unit obligatory	
Temperature alarm device	1 unit obligatory	
Magnetic oil level indicator	1 unit obligatory	
Protection device	1 unit obligatory	
Insulating liquid	Mineral oil	
Cover and tank	High quality steel	
Corrosion protection	Diffection Two component painting	
Assembly Short-circuit proof including su		

	to coils
Windings primary and secondary	Copper
voltage side	
Loss values	According to DIN 42500
Efficiency	≥ 98.5%

## **3** INSPECTION AND TESTING

## **3.1Inspection and Tests at Manufacturer's Premises**

All items of plant shall be subject to inspection and testing before dispatch. The Contractor shall arrange routine and functional tests to demonstrate conformity with the Specification. Inspection at manufacturer's premises will be carried out by an independent inspection agency, or by such person or persons that the Engineer or Employer appoints.

The Tenderer shall list in the Technical Schedules Form I the names of principal manufactures and the locations at which inspections will take place.

No material shall be delivered at the Site without inspection having been carried out or waived in writing by the Engineer.

For the large pumps factory tests will be witnessed by representatives from the Client and Engineer. The Contractor shall notify the Client four weeks in advance of when they are ready to carry out factory testing.

Calibration certificates for instruments used for such tests shall be produced for the Inspector's approval, and if necessary, instruments shall be recalibrated before the commencement of the tests.

In case of failure to prove compliance during the (first) Factory test, all noncompliances are to be remedied and the testing is to be repeated. All Employers' and/or Engineers costs related to the witnessing of the repeated testing are to be borne by the Contractor and will be claimed back from him.

Details of tests to be carried out on particular items of Plant are as follows: 21.1.1. Pumps

Factory acceptance test (FAT)

Each pump shall be individually tested to grade 2 standard, in accordance with ISO9906:2000.

Site-conditions shall be simulated as near as possible, particularly the minimum Site NPSH condition.

Each pump shall be tested complete with all shaft bearings, thrust bearings and any directly driven auxiliaries.

Each pump shall be tested with its own motor. It shall be tested particularly at the warranted performance duty point and over its full working range where possible from its closed valve condition to 30% in excess of its warranted quality. Head/flow curves and overall efficiency/flow curves shall be drawn for each pump.

The curves produced shall be used to demonstrate that the Plant will be capable of meeting the full range of operating conditions at Site.

Pump casing shall be pressure tested to one and a half times the pressure obtainable using full size impellers against a closed delivery valve. The positive suction head shall be taken into account in deciding this pressure.

## Site acceptance Test (SAT)

All pumps shall be properly assembled with the connecting pipe-work and tested, complete with all shaft bearings, thrust bearings and any directly driven auxiliaries. Each pump shall be tested with its own motor. It shall be tested particularly at the warranted performance duty point and over its full working range, where possible from its closed valve condition to 30% in excess of its warranted quantity. Head/flow curves and overall efficiency flow curves shall be drawn for each pimp. The curves shall be used to demonstrate that the pump is capable of meeting the full range of operating conditions at site.

## 21.1.2. Pumpsets

The results of the above described tests on motors and pimps shall be used by the Inspector to determine whether each pumpset has achieved the performance warranted by the Contractor. If a pumpset fails in any respect to achieve the warranted performance, the Contractor shall carry out such further work as he considers necessary and shall arrange the tests to be repeated. This procedure shall be continued until the engineer is satisfied that the pumpset performs as warranted. Provided always that in the case of pumpset failing to pass a test of guaranteed overall efficiency, the pumpset will be rejected, except if the Employer accept the equipment. In this case, the penalty of EUR 1,000, - per additional kW consumption at the design point shall be applied.

## 3.1.1 Motors

All motors (except small motors less than 1kW) shall undergo the following routine tests and performance tests. The tests shall be carried out at normal speeds, the normal speed being the warranted performance speed. Vibration shall be observed at all speeds and the test certificate endorsed accordingly:

- Running light current
- Locked rotor current
- Winding resistance
- High potential
- Temperature rise
- Bearing inspection
- Noise
- Vibration

## **3.1.2 Circuit breakers, Contactors, Starter Panels and Fuse Switch Units3.1.2.1**Routine tests

Power frequency high voltage withstand pressure test with all breakers, and contactors racked in and closed, between phases and from phase to earth. Milli volt drop (doctor) test across circuit breaker contactor, contacts and between extreme terminals on individual panels (for comparison purposes, the manufacturer shall state design values for each size and rating class).

## **3.1.2.2 Operational closing test**

These tests are to ensure the operation of solenoid closing coil or spring release coil and satisfactory closing of the circuit breaker with the voltage on the coil down to 80% of its rated voltage and to ensure that mal operation does not occur, with a voltage at the coil (solenoid closing) of 120% of its rated voltage. On electrically held in contactors, these tests are to ensure capability of the ac operation coil to pick up and seal in at voltage down to 85% of the rated voltage.

## **3.1.2.3 Operational opening tests**

These tests are to ensure the satisfactory operation of the shunt trip circuit and the tripping of the circuit breaker at no load conditions with the trip coil energized at 50% of its rated voltage.

On electrically held in contactors, these tests are to ensure that the contactor coil drop off voltage is not greater than 66% and satisfactory opening of the contactor at this voltage and voltages below.

## 3.1.2.4 Mechanical tests

All mechanical interlocks on the switchgear panels shall be thoroughly tested to ensure their correct operation, together with mechanical tripping opening and isolating devices.

## 3.1.2.5 Interchangeability

On withdrawable circuit breaker panels identically equipped, units such as incoming feeder panels shall be capable of interchanging of circuit breaker trucks. This facility is to be proved.

## 3.1.2.6 Heat run tests

Heat run tests will not be required on panels manufactured under this Contract. Type test figures for heat runs carried out an identical panel types shall be made available for inspection by the Engineer if requested.

## 3.1.2.7 General operation tests

In addition to the tests given above, test shall be conducted where applicable for the following purposes:

• To ensure the satisfactory tripping of the circuit breaker/contactor with the closure coil energized,

• To prove satisfactory mechanical behavior of the circuit breaker when the closing coil is energized with the tripping coil also energized

• To prove that the operation of the power closing device when the circuit breaker/contactor is already closed causes neither damage to the circuit breaker/contactor nor danger to the operator.

## **3.1.2.8** Protection and control circuits

For all forms of protection current transformer, the following information shall be made available to the Inspector prior to the time of inspection:

- Current transformer magnetizing curve
- Recommended relay setting
- Calculated primary operating current at this setting
- Calculated through fault stability values, where applicable
- Values of any stabilizing and setting resisters (if any) employed in the scheme

As far as possible, based on the completeness of the circuits in the final manufactured form within the Manufacturer's premises, the satisfactory operation of associated control and protection circuits shall be proved by the following tests:

- To ensure the correct operation of all current operated protection relays and direct acting coils at the recommended setting by current injection.
- High voltage ac insulation test to the specified level
- To ensure the correct polarity between current and voltage elements of power relays, meters and instruments,
- To ensure the correct operation of all auxiliary protection relays, such as Buchholz protection relays, at normal operating voltage by simulated operation of associated remote relays,

• To ensure the correct operation of control circuits at normal operating voltage by operation of local control switches and Simulation of operation from remote control positions.

Note: The checking of the operation of all protection relays and control circuits is to be carried out with all closing and tripping circuits energized at their normal rated voltage

## 3.1.2.9 Instrument and metering equipment <u>Indicating</u> <u>ammeters</u>

Indicating ammeters shall be checked for calibration at one quarter, one hald and full scale deflection by primary current injection testing if possible. *Indicating voltmeter* 

Indicating voltmeters shall be checked for normal voltage readings by secondary voltage application.

## Integrating kWh meters

Where possible kWh meters shall be tested for correct rotation. Creep tests shall be carried out to ensure that the meter is inoperative with voltage alone, if the secondaries of current transformers are left connected with the primary current interrupted.

## **3.1.2.10** Cabling services and auxiliaries

All cables supplied under the Contract shall be subject to routine tests in accordance with the requirements of the relevant Standard. Each drum of cable supplied to the Site shall be complete with a certificate which shall give proof of compliance with this part of the Specification and the date of such tests. Cable will not be accepted on the Site for installation until these certificates are received and approved by the engineer.

The tests that shall be carried out on every drum of cable shall include:

• High voltage ac insulation withstand test to the specified level, between cores and from individual cores to the earth, metallic sheath or armour as appropriate

- Insulation resistance test
- Core continuity and identification
- Conductor resistance test

## **3.2Installation Inspection**

During erection of the Plant, the Engineer will inspect the installation from time to time in the presence of the Contractor's Supervisor to establish conformity with the requirements of the Specification.

## **3.3Tests at the Site**

For the purpose of carrying out tests on the Plant at the Site, the Thika Water & Sewerage Company Ltd will provide free of charge, pursuant to the Conditions of Contract, a supply of electricity, water etc., as appropriate.

## 3.4Leakage Tests

Leakage tests at maximum working pressure shall be carried out on all erected pipework and valves as soon as possible after erection. The Contractor shall advise the Engineer when these tests are to be carried out.

## **3.5Tests on Completion**

After the Plant has been set to work and the Contractor has ascertained that the Plant is working correctly the Tests on Completion shall be carried out. These tests will require a high degree of cooperation between the Contractor and the Employer and it will be deemed that this has been taken into account in the rates and sums entered in the Schedules. On satisfactory completion of these tests the Taking Over Certificate will be issued.

Details of tests are as follows:

## **3.5.1 Pumpset and Water Metering Equipment**

The test of the main pumps shall be carried out in accordance with BS599, Clause 8f and shall demonstrate that the Plant has been correctly installed, is reliable, in operation under the conditions at Site and is above to operate over its whole working range as far as is possible in the circumstances existing at the Site at the time. Each pump shall be tested at the warranted duty and the minimum and maximum duties as specified. The values obtained will be compared with the values obtained during the tests on the Contractor's premises and any discrepancy shall be rectified. Volumetric measurement of pump discharge will be employed as far as possible for both pump test and water metering equipment tests.

## 3.5.2 Switchgear and Starter Panels

## **3.5.2.1 Power frequency pressure test**

This test shall be carried out with all circuit breaker/contactor panels closed and racked in.

## 3.5.2.2 Mechanical test

All mechanical tests specified for conducting on Manufacturer's premises are to be rechecked to ensure satisfactory operation of the plant in the final erected state.

## **3.5.2.3 Protection and control circuits**

The satisfactory operation of all current operated protection circuits over their whole operating range shall be tested by secondary current injection, where primary injection tests have been previously carried out on Manufacturer's premises.

## **3.5.2.4** Instrument and metering equipment

Tests shall be carried out to ensure the correct operation of current and voltage operated indicating instruments and energy meters, when energized by the actual supply system.

## 3.5.2.5 Continuity of earth conductors

Continuity tests shall be carried out on the earth conductor of the switchboard, such tests being by heavy current injection.

This does not include the earth resistance test of the station earthing system which shall be tested as detailed below.

## 3.5.3 Cables

Every cable shall be subjected to a high voltage withstand test after installation and termination. The test voltages given below shall be applied either alternating current or direct current, and shall be maintained at full value continually for 15 minutes for PILC cables and for 5 minutes for PVC cables. Direct current test voltages shall be 50% higher than arms values of alternating current voltages.

U	<u> </u>
600/1000V	5000V grade mains cable
Between cores	Between cores
Between cores and armour	Between any core and armour
2500AXC	3500AV

Witnessed high voltage pressure tests are not required to control cables, but it shall remain the responsibility of the Contractor to test the insulation of these cables both between cores and from cores to earth during the installation with a Portable 500 Volt insulation tester such as a "Megger" or equivalent.

The Contractor shall test all cables after installation and termination to ensure the correct phasing out of cores and the continuity of the cores, sheath and armour over the whole length of the cable, including cable termination glands for the latter.

## 3.5.4 Earthing System

After the completion of the earthing installation, the Contractor shall demonstrate to the Engineer that the resistance of the electrodes to earth and the continuity of the earth conductors is within the limits of the Specification.

The earth contact resistance and the earth conductor continuity from each major piece of plant, i.e. main switchboards and power transformers, etc shall be measured by using a suitable testers.

## 3.5.5 Supervisory System Equipment

The Contractor shall demonstrate the correct operation and accuracy of the equipment supplied under the Contract in the manner indicated below or as otherwise directed by or agreed with the Engineer:

## • Pressure instruments

A deadweight tester shall be applied to each pressure transmitter at points equivalent to 25%, 50%, 75% and 100% full scale for rising and falling pressure to prove that a correct output signal is produced at these values,

## • Pressure Switches

A deadweight tester shall be applied to each pressure switch at points equivalent to 25%, 50% and 75% full scale to prove correct operation when present to switch at these values.

• All push buttons, control switches and equipment state indicating lamps shall be shown to function correctly utilizing the actual plant concerned wherever possible.

• All alarms and trips shall be tested by operation of the primary initiating device.

• All receiving instruments, analogue and digital displays, data loggers, lamp and alarm indications, control functions, etc., and transmission systems shall be shown to operate correctly utilizing the plant or

equipment concerns.

If line monitoring equipment is not included in telemetry equipment, the contractor shall provide such equipment and connect so that the performance of the communication link may be observed during the test.

Any equipment supplied under the Contract that requires readjustment during the above tests shall alter readjustment, again be demonstrated by the Contractor to the satisfaction of the Engineer.

After the engineer has signified his approval of the complete control and instrumentation installation, The Contractor shall demonstrate that the equipment operates continuously in the satisfactory manner for a period of seven consecutive days or for any other such period as may be previously agreed with the Engineer. During the whole of this period, the Contractor shall operate and adjust the Plant supplied under the Contract as instructed by the Engineer.

The seven day period of operation shall complete the Tests on Completion for these sections of the Plant involved.

## **3.6Test Certificates**

The results of all works and site tests carried out by the Contractor, in accordance with the requirements of Clauses 12.2 and 12.5 shall be recorded, certified and submitted to the Engineer in triplicate.

The cost of providing all certificates and reports shall be deemed to be included in the rates and sums listed in the Schedules.

## **3.7Erection, Setting to Work and Maintenance**

The Contractor shall provide at least three (3) skilled working erectors to supervise the installation, erection, commissioning and running maintenance of the plant. At least one skilled erector shall be provided with suitable qualifications to supervise each of the following major work components:

- Pumps, motors and piping installations
- Instrumentation installation
- Electrical equipment installations and wiring
- Plant works (installation of lamella separator, sludge scrapers,)
- Civil works

The Contractor shall not remove his supervisor/erectors from the site without prior approval in writing from the Engineer.

## **3.8Instrument Installation**

All measuring instruments shall be installed in accordance with the recommendations or instruction of the instrument manufacturer. Each mounting position shall be chosen to give correct operation of the equipment, faithful reproduction of the quantity to be measured, ease of operation, reading, maintenance and servicing, and freedom from any condition which could have adverse effects.

## **3.9Connection of Electrical Power**

The Contractor shall check all items of electrical plant for correct phasing and insulation resistance. Motors and control equipment shall be dried out and checks on the insulation resistance shall be made at regular intervals. Drying out shall continue until the insulation resistance reaches a ready value. After all drying out and checking of insulation resistance is complete the Contractor shall check that all electrical connections to his equipment are correct, and errors shall be corrected immediately.

## 3.10 Setting to Work

After the equipment has been erected to the satisfaction of the Engineer, the Contractor shall set the equipment to work and shall continue to operate it for a period of one week.

When the Contractor is satisfied that the equipment is working correctly he shall inform the Engineer that he is ready for the Tests on Completion.

## **3.11 Period of Instruction and Running Maintenance**

The maintenance period will start after issuing the Taking Over Certificate. The first four weeks of the maintenance period shall be a "period of instruction and running maintenance" during which time the Contractor shall provide for 40 hours each week the services of his erection in order to instruct the Employer's own operators to operate and maintain the equipment. Verbal instructions relating to operating procedures additional to any given in the instruction manuals shall be confirmed in writing. The Manual shall be updated respectively in order to contain all relevant information after the training period is finished.

The requirements of this clause shall not limit the Contractor's obligations under the Conditions of Contract.

## 4 ENVIRONMENTAL GUIDELINES FOR CONTRACTORS

These Environmental Guidelines for Contractors are prepared for all the contractors to be engaged for the NWDPII construction activities. The guidelines include provisions for proper management of construction sites, safe storage of construction materials and safe disposal of wastes including asbestos wastes.

## 4.1 General Considerations

• The contractor shall, in all his activities ensure maximum protection of the environment and the socio-economic wellbeing of the people affected by the project, whether within or outside the physical boundaries of the project area.

• Before any construction works begin, the contractor shall ensure that the relevant environmental and land acquisition certificates of authorization for the works have been obtained from the Director of Environmental Affairs and/or the Commissioner for Lands.

• In general, the contractor shall familiarize himself with the ESMF and the RPF for the NWDP II. Specifically, the contractor shall make every effort to follow and implement the recommendations and mitigation measures of the EMP and the RAPs or ARAPs, to the satisfaction of the MoIWD and the EAD, or any such persons or agencies appointed by the MoIWD or the EAD, to inspect the environmental and social components of the NWDP II.

• The contractor shall work in cooperation and in coordination with the Project Management Team and/or any other authority appointed to perform or to ensure that the social and environmental work is performed according to the provisions of the ESMF, RPF, RAPS, ARAPs and EMP for the NWDP II.

• The contractor shall always keep on site and make available to Environmental Inspectors or any authorized persons, copies of the EMPs, RAPs and ARAPs for the monitoring and evaluation of environmental and social impacts and the level or progress of their mitigation.

## 4.2 Acquisition of Construction Materials

The contractor shall ensure that construction materials such as sand, quarry stone, soils or any other construction materials are acquired from approved suppliers and that the production of these materials by the suppliers or the contractor does not violate the environmental regulations or procedures as determined by the EAD.

## 4.3 Movement and Transportation of Construction Materials

The movement and transportation of construction materials to and within the construction sites shall be done in a manner that generates minimum impacts on

the environment and on the community, as required by the EMPs and the RAPs or ARAPs.

4.4 Storage of Construction Materials and Equipment Construction materials shall be stored in a manner to ensure that:

• There is no obstruction of service roads, passages, driveways and footpaths;

• Where it is unavoidable to obstruct any of the service paths, the contractor shall provide temporary or alternate by-passes without inconveniencing the flow of traffic or pedestrians;

- There is no obstruction of drainage channels and natural water courses;
- There is no contamination of surface water, ground water or the ground;
- There is no access by public or unauthorized persons, to materials and equipment storage areas;

• There is no access by staff, without appropriate protective clothing, to materials and equipment storage areas;

• Access by staff and public or unauthorized persons, to hazardous, corrosive or poisonous substances including sludge, chemicals, solvents, oils, asbestos cement dust or their receptacles such as boxes, drums, sacks and bags is prohibited;

4.5 Safe Disposal of Construction Waste

Construction waste includes but is not limited to asbestos pipes combustion products, dust, metals, rubble, timber, water, waste water and oil. Hence construction waste constitutes solid, liquid and gaseous waste and smoke.

In performing his activities, the contractor shall use the best practical means for preventing emissions of noxious or offensive substances into the air, land and water. He shall make every effort to render any such emissions (if unavoidable) inoffensive and harmless to people and the environment. The means to be used for making the emissions harmless or for preventing the emissions shall be in accordance to the RAPs, ARAPs or the EMPs and with the approval of the relevant Local Authority or the Environmental Affairs Department.

The contractor shall, in particular, comply with the regulations for disposal of asbestos cement pipes, construction/demolition wastes, wastewater, combustion products, dust, metals, rubble and timber. Wastewater treatment and discharge will conform to the applicable regulations by the relevant Local Authority and Ministry of Irrigation and Water Development. Asbestos wastes, and other hazardous wastes shall be treated and disposed of in conformity with the national regulations and where applicable, with the supervision of qualified personnel.

4.6 Health and Safety of Workers

The contractor shall protect the health and safety of workers by providing the necessary and approved protective clothing and by instituting procedures and practices that protect the workers from dangerous operations. The contractor shall be guided by and shall adhere to the relevant national Labour Regulations for the protection of workers.

## 4.7 Chance Finds Procedures for Physical Cultural Resources

If, during project construction, the contractor or project workers encounter archaeological relics, fossils, human remains, or other items of historical or other cultural value, the contractor shall (1) temporarily suspend any works which might damage these items and (2) inform the Client, or other competent authority, for instructions or guidance regarding the appropriate next steps to evaluate, salvage, recover, protect, and/or document the items found.

#### SECTION VII - ACTIVITY SCHEDULE-NOT APPLIOCABLE

#### Objectives

The objectives of the Activity Schedule are:-

- (a) to provide sufficient information on the quantities of Services to be performed to enable Tenders to be prepared efficiently and accurately; and
- (b) when a Contract has been entered into, to provide a priced Activity Schedule for use in the periodic valuation of Services executed.

In order to attain these objectives, Services should be itemized in the Activity Schedule insufficient detail to distinguish between the different classes of Services, or between Services of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Activity Schedule should be as simple and brief as possible.

#### Day work Schedule

A Day work Schedule should be included only if the probability of unforeseen work, outside the items included in the Activity Schedule, is high. To facilitate checking by the Procuring Entity of the realism of rates quoted by the Tenderers, the Day work Schedule should normally comprise the following:

- a) A list of the various classes of Services, labor, materials, and plant for which basic day work rates or prices are to be inserted by the Tenderer, together with a statement of the conditions under which the Service Provider will be paid for services delivered on a day work basis.
- b) Nominal quantities for each item of Day work, to be priced by each Tenderer at Day work rates as Tender. The rate to be entered by the Tenderer against each basic Day work item should include the Service Provider's profit, overheads, supervision, and other charges.

#### **Provisional Sums**

The estimated cost of specialized services to be carried out, or of special goods to be supplied, by other Service Providers should be indicated in the relevant part of the Activity Schedule as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Procuring Entity to select such specialized Service Providers. To provide an element of competition among the Tenderers in respect of any facilities, amenities, attendance, etc., to be provided by the successful Tenderer as prime Service Provider for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Activity Schedule inviting the Tenderer to quote a sum for such amenities, facilities, attendance, etc.

These Notes for Preparing an Activity Schedule are intended only as information for the Procuring Entity or the person drafting the tendering document. They should not be included in the final documents.

#### PERFORMANCE SPECIFICATIONS AND DRAWINGS - NOT APPLOCABLE

#### (Describe Out puts and Performances, rather than Inputs, wherever

#### possible) Notes on Specifications

A set of precise and clear specifications is a prerequisite for Tenderers to respond realistically and competitively to the requirements of the Procuring Entity without qualifying or conditioning their Tenders. In the context of international competitive Tendering, the specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of economy, efficiency, and fairness in procurement be realized, responsiveness of Tenders be ensured, and the subsequent task of Tender evaluation facilitated. The specifications should require that all goods and materials to be incorporated in the Services be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

Samples of specifications from previous similar projects are useful in this respect. The use of metric units is encouraged. Most specifications are normally written specially by the Procuring Entity to suit the Contract in hand. There is no standard set of Specifications for universal application in all sectors, but there are established principles and practices, which are reflected in this document

There are considerable advantages in standardizing General Specifications for repetitive Services in recognized public sectors, such as education, health, sanitation, social and urban housing, roads, ports, railways, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in the provision of Services, although not necessarily to be used in a particular Services Contract. Deletions or addenda should then adapt the General Specifications to the particular Services.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for goods, materials, Services, and workmanship, recognized international standards should be used as much as possible. Where other particular standards are used, whether national standards of Kenya or other standards, the specifications should state that goods, materials, Services and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, will also be acceptable.

If technical alternatives for parts of the Services are permitted in the tendering document, these parts shall be described in this Section.

These Notes for Preparing Specifications are intended only as information for the Procuring Entity or the person drafting the tendering document.

#### SECTION VIII - GENERAL CONDITIONS OF CONTRACT

#### **1.** General Provisions

#### **1.1 Definitions**

Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:

- a) The Adjudicator is the person appointed jointly by the Procuring Entity and the Service Provider to resolve disputes in the first instance, as provided for in Sub-Clause 8.2 hereunder.
- b) "Activity Schedule" is the priced and completed list of items of Services to be performed by the Service Provider forming part of his Tender;
- d) "Completion Date" means the date of completion of the Services by the Service Provider as certified by the Procuring Entity
- e) "Contract" means the Contract signed by the Parties, to which these General Conditions of Contract (GCC) are attached, together with all the documents listed in Clause1of such signed Contract;
- f) "Contract Price" means the price to be paid for the performance of the Services, in accordance with Clause 6;
- g) "Day works" means varied work inputs subject to payment on a time basis for the Service Provider's employees and equipment, in addition to payments for associated materials and administration.
- h) "Procuring Entity" means the Procuring Entity or party who employs the Service Provider
- i) "Foreign Currency" means any currency other than the currency of Kenya;
- j) "GCC" means these General Conditions of Contract;
- k) "Government" means the Government of Kenya;
- 1) "Local Currency" means Kenya shilling;
- m) "Member," in case the Service Provider consist of a joint venture of more than one entity, means any of these entities; "Members" means all these entities, and "Member in Charge" means the entity specified in the SC to act on their behalf in exercising all the Service Provider' rights and obligations towards the Procuring Entity under this Contract;
- n) "Party" means the Procuring Entity or the Service Provider, as the case may be, and "Parties" means both of them;
- o) "Personnel" means persons hired by the Service Provider or by any Subcontractor as employees and assigned to the performance of the Services or any part thereof;
- p) "Service Provider" is a person or corporate body whose Tender to provide the Services has been accepted by the Procuring Entity;
- q) "Service Provider's Tender" means the completed Tendering Document submitted by the Service Provider to the Procuring Entity
- r) "SCC" means the Special Conditions of Contract by which the GCC may be amended or supplemented;
- s) "Specifications" means the specifications of the service included in the Tendering Document submitted by the Service Provider to the Procuring Entity
- t) "Services" means the work to be performed by the Service Provider pursuant to this Contract, as described in Appendix A; and in the Specifications and Schedule of Activities included in the Service Provider's Tender.
- u) "Subcontractor" means any entity to which the Service Provider subcontracts any part of the Services in accordance with the provisions of Sub-Clauses 3.5 and 4;
- v) "Public Procurement Regulatory Authority (PPRA)" shall mean the Government Agency responsible for oversight of public procurement.
- w) "Project Manager" shall the person appointed by the Procuring Entity to act as the Project Manager for the purposes of the Contract and named in the Particular Conditions of Contract, or other person appointed from time to time by the Procuring Entity and notified to the Contractor.

x) "Notice of Dissatisfaction" means the notice given by either Party to the other indicating its dissatisfaction and intention to commence arbitration.

#### 1.2 Applicable Law

The Contract shall be interpreted in accordance with the laws of Kenya.

#### 1.3 Language

This Contract has been executed in the English language, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.

#### 1.4 Notices

Any notice, request, or consent made pursuant to this Contract shall be in writing and shall be deemed to have been made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent by registered mail, hand delivery, or email to such Party at the address **specified in the SCC**.

#### **1.5 Location**

The Services shall be performed at such locations as are specified in Appendix A, in the specifications and, where the location of a particular task is not so specified, at such locations, whether in Kenya or elsewhere, as the Procuring Entity may approve.

#### **1.6 Authorized Representatives**

Any action required or permitted to be taken, and any document required or permitted to be executed, under this Contract by the Procuring Entity or the Service Provider may be taken or executed by the officials **specified in the SCC.** 

#### **1.7 Inspection and Audit by the PPRA**

Pursuant to paragraph 2.2 e. of Attachment 1 to the General Conditions, the Service Provider shall permit and shall cause its subcontractors and sub-consultants to permit, PPRA and/or persons appointed by PPRA to inspect the Site and/or the accounts and records relating to the procurement process, selection and/or contract execution, and to have such accounts and records audited by auditors appointed by PPRA. The Service Provider's and its Subcontractors' and sub-consultants' attention is drawn to Sub-Clause 3.10 which provides, *inter alia*, that acts intended to materially impede the exercise of PPRA's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to PPRA's prevailing sanctions procedures).

#### **1.8 Taxes and Duties**

The Service Provider, Subcontractors, and their Personnel shall pay such taxes, duties, fees, and other impositions as may be levied under the Applicable Law, the amount of which is deemed to have been included in the Contract Price.

#### 2. <u>Commencement, Completion, Modification, and Termination of Contract</u>

#### **2.1 Effectiveness of Contract**

This Contract shall come into effect on the date the Contract is signed by both parties or such other later date as may be **stated in the SCC.** 

#### 2.2 Commencement of Services

The Service Provider shall start carrying out the Services thirty (30) days after the date the Contract becomes effective, or at such other date as may be **specified in the SCC**.

#### **2.3 Intended Completion Date**

Unless terminated earlier pursuant to Sub-Clause 2.6, the Service Provider shall complete the activities by

the Intended Completion Date, as is **specified in the SCC.** If the Service Provider does not complete the activities by the Intended Completion Date, it shall be liable to pay liquidated damage as per Sub-Clause 3.8. In this case, the Completion Date will be the date of completion of all activities.

#### 2.4 Modification

Modification of the terms and conditions of this Contract, including any modification of the scope of the Services or of the Contract Price, may only be made by written agreement between the Parties.

#### 2.5 Value Engineering

2.5.1 The Service Provider may prepare, at its own cost, a value engineering proposal at any time during the performance of the contract. The value engineering proposal shall, at a minimum, include the following;

- a) The proposed change(s), and a description of the difference to the existing contract requirements;
- b) a full cost/benefit analysis of the proposed change(s) including a description and estimate of costs (including life cycle costs, if applicable) the Procuring Entity may incur in implementing the value engineering proposal; and
- c) a description of any effect(s) of the change on performance/functionality.

2.5.2 The Procuring Entity may accept the value engineering proposal if the proposal demonstrates benefits that:

- a) accelerates the delivery period; or
- b) reduces the Contract Price or the lifecycle costs to the Procuring Entity; or
- c) improves the quality, efficiency, safety or sustainability of the services; or
- d) yields any other benefits to the Procuring Entity, without compromising the necessary functions of the Facilities.

2.5.3 If the value engineering proposal is approved by the Procuring Entity and results in:

- a) a reduction of the Contract Price; the amount to be paid to the Service Provider shall be the percentage specified in the SCC of the reduction in the Contract Price; or
- b) an increase in the Contract Price; but results in a reduction in lifecycle costs due to any benefit described in
  - (a) to (d) above, the amount to be paid to the Service Provider shall be the full increase in the Contract Price.

#### 2.6 Force Majeure

#### 2.6.1 Definition

For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances.

#### 2.6.2 No Breach of Contract

The failure of a Party to fulfill any of its obligations under the contract shall not be considered to be a breach of, or default under, this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event (a) has taken all reasonable precautions, due care and reasonable alternative Measures in order to carry out the terms and conditions of this Contract, and (b) has informed the other Party as soon as possible about the occurrence of such an event.

#### 2.6.3 Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.

#### 2.6.5 Payments

During the period of their inability to perform the Services as a result of an event of Force Majeure, the Service Provider shall be entitled to continue to be paid under the terms of this Contract, as well as to be

reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purposes of the Services and in reactivating the Service after the end of such period.

#### 2.7 Termination

#### 2.7.1 By the Procuring Entity

The Procuring Entity may terminate this Contract, by not less than thirty (30) days' written notice of termination to the Service Provider, to be given after the occurrence of any of the events specified in paragraphs (a) through (1) = 0.012 (b) and (2) = 0.000

(d) of this Sub-Clause 2.6.1:

- a) If the Service Provider does not remedy a failure in the performance of its obligations under the Contract, within thirty (30) days after being notified or within any further period as the Procuring Entity may have subsequently approved in writing;
- b) If the Service Provider become insolvent or bankrupt;
- c) if, as the result of Force Majeure, the Service Provider is unable to perform a material portion of the Services for a period of not less than sixty (60) days; or
- d) if the Service Provider, in the judgment of the Procuring Entity has engaged in Fraud and Corruption, as defined in paragraph 2.2 a. of Attachment 1 to the GCC, in competing for or in executing the Contract

#### 2.7.2 By the Service Provider

The Service Provider may terminate this Contract, by not less than thirty (30) days' written notice to the Procuring Entity, such notice to be given after the occurrence of any of the events specified in paragraphs (a) and

(b) of this Sub-Clause 2.6.2:

- a) If the Procuring Entity fails to pay any monies due to the Service Provider pursuant to this Contract and not subject to dispute pursuant to Clause 7 within forty-five (45) days after receiving written notice from the Service Provider that such payment is overdue; or
- b) if, as the result of Force Majeure, the Service Provider is unable to perform a material portion of the Services for a period of not less than sixty (60) days.

#### 2.7.3 Payment upon Termination

Upon termination of this Contract pursuant to Sub-Clauses 2.6.1 or 2.6.2, the Procuring Entity shall make the following payments to the Service Provider:

- a) remuneration pursuant to Clause 6 for Services satisfactorily performed prior to the effective date of termination;
- b) except in the case of termination pursuant to paragraphs (a), (b), (d) of Sub-Clause 2.6.1, reimbursement of any reasonable cost incident to the prompt and orderly termination of the Contract, including the cost of the return travel of the Personnel.

#### 3. Obligations of the Service Provider

#### 3.1 General

The Service Provider shall perform the Services in accordance with the Specifications and the Activity Schedule, and carry out its obligations with all due diligence, efficiency, and economy, in accordance with generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advanced technology and safe methods. The Service Provider shall always act, in respect of any matter relating to this Contractor to the Services, as faithful adviser to the Procuring Entity, and shall at all times support and safeguard the Procuring Entity's legitimate interests in any dealings with Subcontractors or third parties.

#### **3.2** Conflict of Interests

### **3.2.1** Service Provider Not to Benefit from Commissions and Discounts.

The remuneration of the Service Provider pursuant to Clause 6 shall constitute the Service Provider's sole

remuneration in connection with this Contract or the Services, and the Service Provider shall not accept for their own benefit any trade commission, discount, or similar payment in connection with activities pursuant to this Contract or to the Services or in the discharge of their obligations under the Contract, and the Service Provider shall use their best efforts to ensure that the Personnel, any Subcontractors, and agents of either of them similarly shall not receive any such additional remuneration.

#### 3.2.2 Service Provider and Affiliates Not to be Otherwise Interested in Project

The Service Provider agree that, during the term of this Contract and after its termination, the Service Provider and its affiliates, as well as any Subcontractor and any of its affiliates, shall be disqualified from providing goods, works, or Services (other than the Services and any continuation thereof) for any project resulting from or closely related to the Services.

#### 3.2.3 Prohibition of Conflicting Activities

Neither the Service Provider nor its Subcontractors nor the Personnel shall engage, either directly or indirectly, in any of the following activities:

- a) During the term of this Contract, any business or professional activities in Kenya which would conflict with the activities assigned to them under this Contract;
- b) during the term of this Contract, neither the Service Provider nor their Subcontractors shall hire public employees in active duty or on any type of leave, to perform any activity under this Contract;
- c) after the termination of this Contract, such other activities as may be **specified in the SCC.**

#### **3.3** Confidentiality

The Service Provider, its Subcontractors, and the Personnel of either of them shall not, either during the term or within two (2) years after the expiration of this Contract, disclose any proprietary or confidential information relating to the Project, the Services, this Contract, or the Procuring Entity's business or operations without the prior written consent of the Procuring Entity.

**3.4 The Service Provider** (a) shall take out and maintain, and shall cause any Subcontractors to take out and maintain, at its (or the Subcontractors', as the case may be) own cost but on terms and conditions approved by the Procuring Entity, insurance against the risks, and for the coverage, as shall be **specified in the SCC;** and (b) at the Procuring Entity's request, shall provide evidence to the Procuring Entity showing that such insurance has been taken out and maintained and that the current premiums have been paid.

#### 3.5 Service Provider's Actions Requiring Procuring Entity's Prior Approval

The Service Provider shall obtain the Procuring Entity's prior approval in writing before taking any of the following actions:

- a) enteringintoasubcontractfortheperformanceofanypartoftheServices,
- b) appointing such members of the Personnel not listed by name in Appendix C ("Key Personnel and Subcontractors"),
- c) changing the Program of activities; and
- d) any other action that may be **specified in the SCC.**

#### **3.6 Reporting Obligations**

The Service Provider shall submit to the Procuring Entity the reports and documents specified in Appendix Bin the form, in the numbers, and within the periods set forth in the said Appendix.

#### 3.7 Documents Prepared by the Service Provider to Be the Property of the Procuring Entity

All plans, drawings, specifications, designs, reports, and other documents and software submitted by the Service Provider in accordance with Sub-Clause 3.6 shall become and remain the property of the Procuring Entity, and the Service Provider shall, not later than upon termination or expiration of this Contract, deliver all such documents and software to the Procuring Entity, together with a detailed inventory thereof. The Service Provider may retain a copy of such documents and software. Restrictions about the future use of these documents, if any, shall be **specified in the SCC.** 

#### **3.8 Liquidated Damages**

#### **3.8.1 Payments of Liquidated Damages**

The Service Provider shall pay liquidated damages to the Procuring Entity at the rate per day **stated in the SCC** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount **defined in the SCC**. The Procuring Entity may deduct liquidated damages from payments due to the Service Provider. Payment of liquidated damages shall not affect the Service Provider's liabilities.

#### 3.8.2 Correction for Over-payment

If the Intended Completion Date is extended after liquidated damages have been paid, the Procuring Entity shall correct any overpayment of liquidated damages by the Service Provider by adjusting the next payment certificate. The Service Provider shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in Sub-Clause 6.5.

#### **3.8.3 Lack of performance penalty**

If the Service Provider has not corrected a Defect within the time specified in the Procuring Entity's notice, a penalty for Lack of performance will be paid by the Service Provider. The amount to be paid will be calculated as a percentage of the cost of having the Defect corrected, assessed as described in Sub-Clause 7.2 and **specified in the SCC.** 

#### **3.9 Performance Security**

The Service Provider shall provide the Performance Security to the Procuring Entity no later than the date specified in the Form of acceptance. The Performance Security shall be issued in an amount and form and by a bank or surety acceptable to the Procuring Entity, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The performance Security shall be valid until a date 28 day from the Completion Date of the Contract in case of a bank guarantee, and until one year from the Completion Date of the Contract in the case of a Performance Bond.

#### **3.10 Fraud and Corruption**

The Procuring Entity requires compliance with the Government's Anti-Corruption laws and its prevailing sanctions. The Procuring Entity requires the Service Provider to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the tendering process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

#### **3.11 Sustainable Procurement**

The Service Provider shall conform to the sustainable procurement contractual provisions, if and as specified in the **SCC**.

#### 4. Service Provider's Personnel

#### 4.1 Description of Personnel

The titles, agreed job descriptions, minimum qualifications, and estimated periods of engagement in the carrying out of the Services of the Service Provider's Key Personnel are described in Appendix C. The Key Personnel and Subcontractors listed by title as well as by name in Appendix C are hereby approved by the Procuring Entity.

#### 4.2 Removal and/or Replacement of Personnel

a) Except as the Procuring Entity may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Service Provider, it becomes necessary to replace any of the Key Personnel, the Service Provider shall provide as a replacement a person of equivalent or better qualifications.

- b) If the Procuring Entity finds that any of the Personnel have (i) committed serious misconduct or have been charged with having committed a criminal action, or (ii) have reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Service Provider shall, at the Procuring Entity's written request specifying the grounds thereof, provide as a replacement a person with qualifications and experience acceptable to the Procuring Entity.
- c) The Service Provider shall have no claim for additional costs arising out of or incidental to any removal and/or replacement of Personnel.

#### 5. Obligations of the Procuring Entity

#### **5.1** Assistance and Exemptions

The Procuring Entity shall use its best efforts to ensure that the Government shall provide the Service Provider such assistance and exemptions as **specified in the SCC.** 

#### **5.2** Change in the Applicable Law

If, after the date of this Contract, there is any change in the Applicable Law with respect to taxes and duties which increases or decreases the cost of the Services rendered by the Service Provider, then the remuneration and reimbursable expenses otherwise payable to the Service Provider under this Contract shall be increased or decreased accordingly by agreement between the Parties, and corresponding adjustments shall be made to the amounts referred to in Sub-Clauses 6.2 (a) or (b), as the case may be.

#### **5.3 Services and Facilities**

The Procuring Entity shall make available to the Service Provider the Services and Facilities listed under Appendix F.

#### 6. Payments to the Service Provider

#### 6.1 Lump-Sum Remuneration

6.1.1 The Service Provider's remuneration shall not exceed the Contract Price and shall be a fixed lump-sum including all Subcontractors' costs, and all other costs incurred by the Service Provider in carrying out the Services described in Appendix A. Except as provided in Sub-Clause 5.2, the Contract Price may only be increased above the amounts stated in Sub-Clause 6.2 if the Parties have agreed to additional payments in accordance with Sub- Clauses 2.4 and 6.3.

6.1.2 Where the contract price is different from the corrected tender price, in order to ensure the contract or is not paid less or more relative to the contract price (*which would be the tender price*), any part payment valuation and variation orders on omissions and additions valued based on rates in the schedule of rates in the Tender, will be adjusted by a <u>plus or minus</u> percentage. The percentage already worked out during tender evaluation is worked out as follows: (*corrected tender price-tender price*)/tenderpriceX100.

#### 6.2 Contract Price

- a) The price payable is set forth in the SCC.
- b) No price will be payable in foreign currency.

#### 6.3 Payment for Additional Services, and Performance Incentive Compensation

- 6.3.1 For the purpose of determining the remuneration due for additional Services as may be agreed under Sub-Clause 2.4, a breakdown of the lump-sum price is provided in Appendices D and E.
  - **6.3.2 If the SCC so specify,** the service provider shall be paid performance incentive compensation as set out in the Performance Incentive Compensation appendix.

#### 6.4 Terms and Conditions of Payment

Payments will be made to the Service Provider according to the payment schedule **stated in the SCC. Unless otherwise stated in the SCC**, the advance payment (Advance for Mobilization, Materials and Supplies) shall be made against the provision by the Service Provider of a bank guarantee for the same amount, and

shall be valid for the period **stated in the SCC.** Any other payment shall be made after the conditions **listed in the SCC** for such payment have been met, and the Service Provider have submitted an invoice to the Procuring Entity specifying the amount due.

#### **6.5 Interest on Delayed Payments**

If the Procuring Entity has delayed payments beyond thirty (30) days after the due date stated in the SCC, interest shall be paid to the Service Provider for each day of delay at the rate stated in **the SCC**.

#### 6.6 Price Adjustment

6.6.1 Prices shall be adjusted for fluctuations in the cost of inputs only if **provided for in the SCC.** If so provided, the amounts certified in each payment certificate, after deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type indicated below applies to each Contract currency:

#### $P_c = A_c + B_c Lmc/Loc + C_c Imc/Ioc$

Where:

P<sub>c</sub> is the adjustment factor for the portion of the Contract Price payable in a specific currency "c".

 $A_c$ ,  $B_c$  and  $C_c$  are coefficients specified in the **SCC**, representing:  $A_c$  the non-adjustable portion;  $B_c$  the adjustable portion relative to labor costs and  $C_c$  the adjustable portion for other inputs, of the Contract Price payable in that specific currency "c"; and

Lmc is the index prevailing at the first day of the month of the corresponding invoice date and Loc is the index prevailing 28 days before Tender opening for labor; both in the specific currency "c".

Imc is the index prevailing at the first day of the month of the corresponding invoice date and Ioc is the index prevailing 28 days before Tender opening for other inputs payable; both in the specific currency "c".

If a price adjustment factor is applied to payments made in a currency other than the currency of the source of the index for a particular indexed input, a correction factor Zo/Zn will be applied to the respective component factor of pn for the formula of the relevant currency. Zo is the number of units of Kenya Shillings of the index, equivalent to one unit of the currency payment on the date of the base index, and Zn is the corresponding number of such currency units on the date of the current index.

6.6.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

#### 6.7 Day works

- 6.7.1 If applicable, the Day work rates in the Service Provider's Tender shall be used for small additional amounts of Services only when the Procuring Entity has given written instructions in advance for additional services to be paid in that way.
- 6.7.2 All work to be paid for as Dayworks shall be recorded by the Service Provider on forms approved by the Procuring Entity. Each completed form shall be verified and signed by the Procuring Entity representative as indicated in Sub-Clause 1.6 within two days of the Services being performed.
- 6.7.3 The Service Provider shall be paid for Dayworks subject to obtaining signed Dayworks forms as indicated in Sub-Clause 6.7.2

#### 7. Quality Control

#### 7.1 Identifying Defects

The principle and modalities of Inspection of the Services by the Procuring Entity shall be as **indicated in the SCC.** The Procuring Entity shall check the Service Provider's performance and notify him of any Defects that are found. Such checking shall not affect the Service Provider's responsibilities. The Procuring Entity may instruct the Service Provider to search for a Defect and to uncover and test any service that the Procuring Entity considers may have a Defect. Defect Liability Period is as **defined in the SCC**.

#### 7.2 Correction of Defects, and Lack of Performance Penalty

a) The Procuring Entity shall give notice to the Service Provider of any Defects before the end of the Contract. The Defects liability period shall be extended for as long as Defects remain to be corrected.

b) Every time notice a Defect is given, the Service Provider shall correct the notified Defect within the length of time specified by the Procuring Entity's notice.

c) If the Service Provider has not corrected a Defect within the time specified in the Procuring Entity's notice, the Procuring Entity will assess the cost of having the Defect corrected, the Service Provider will pay this amount, and a Penalty for Lack of Performance calculated as described in Sub-Clause 3.8.

#### 8. <u>Settlement of Disputes</u>

#### **8.1 Contractor's Claims**

- 8.1.1If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Project Manager, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.
- 8.1.2If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Procuring Entity shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.
- 8.1.3The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.
- 8.1.4The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Project Manager. Without admitting the Procuring Entity's liability, the Project Manager may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contract or to keep further contemporary records. The Contractor shall permit the Project Manager to inspect all these records, and shall (if instructed) submit copies to the Project Manager.
- 8.1.5 Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Project Manager, the Contractor shall send to the Project Manager a fully detailed claim which includes full Supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:
  - a) This fully detailed claim shall be considered as interim;
  - b) The Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Project Manager may reasonably require; and
  - c) The Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Project Manager.
- 8.1.6 Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Project Manager and approved by the Contractor, the Project Manager shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall never the less give his response on the principles of the claim with in the above defined time period.
- 8.1.7 Within the above defined period of 42 days, the Project Manager shall proceed in accordance with Sub-Clause

3.5 [Determinations] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

8.1.8 Each Payment Certificate shall include such additional payment for any claim as has been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied

are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

- 8.1.9 If the Project Manager does not respond within the time frame defined in this Clause, either Party may consider that the claim is rejected by the Project Manager and any of the Parties may refer to Arbitration in accordance with Sub-Clause 8.2 [Matters that may be referred to arbitration].
- 8.1.10 The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

#### 8.2 Matters that may be referred to arbitration

- **8.2.1** Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion of the Services or abandonment of the Services or termination of the Contract by either party:
  - a) The appointment of a replacement Project Manager upon the said person ceasing to act.
  - b) Whether or not the issue of an instruction by the Project Manager is empowered by these Conditions.
  - c) Whether or not a certificate has been improperly withheld or is not in accordance with these Conditions.
  - e) Any dispute arising in respect of war risks or war damage.
  - f) All other matters shall only be referred to arbitration after the completion or alleged completion of the Services or termination or alleged termination of the Contract, unless the Procuring Entity and the Contractor agree otherwise in writing.

#### **8.3 Amicable Settlement**

Where a Notice of Dissatisfaction has been given, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, the Party giving a Notice of Dissatisfaction in accordance with Sub-Clause 8.1 above should move to commence arbitration after the fifty- sixth day from the day on which a Notice of Dissatisfaction was given, even if no attempt at an amicable settlement has been made.

#### 8.4 Arbitration

- 8.4.1 Any claim or dispute between the Parties arising out of or in connection with the Contract not settled amicably in accordance with Sub-Clause 8.3 shall be finally settled by arbitration. Arbitration shall be conducted in accordance with the Arbitration Laws of Kenya.
  - 8.4.2The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Project Manager, relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Project Manager from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute.
  - 8.4.3Party shall be limited in the proceedings before the arbitrators to the evidence, or to the reasons for dissatisfaction given in its Notice of Dissatisfaction.
  - 8.4.5 Arbitration may be commenced prior to or after completion of the services. The obligations of the Parties, and the Project Manager shall not be altered by reason of any arbitration being conducted during the progress of the services.
  - 8.4.6The terms of the remuneration of each or all the members of Arbitration shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.

#### **8.5** Arbitration with proceedings

8.5.1 In case of any claim or dispute, such claim or dispute shall be notified in writing by either party to the other with a request to submit it to arbitration and to concur in the appointment of an Arbitrator within thirty days

of the notice. The dispute shall be referred to the arbitration and final decision of a person to be agreed between the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointed, on the request of the applying party, by the Chairman or Vice Chairman of any of the following professional institutions;

- i) Law Society of Kenya or
- ii) Chartered Institute of Arbitrators (Kenya Branch)
- 8.5.2The institution written to first by the aggrieved party shall take precedence overall other institutions.
- 8.5.3 The arbitration may be on the construction of this Contract or on any matter or thing of whatsoever nature arising there under or in connection there with, including any matter or thing left by this Contract to the discretion of the Project Manager, or the withholding by the Project Manager of any certificate to which the Contractor may claim to be entitled to or the measurement and valuation referred to in clause 23.0 of these conditions, or the rights and liabilities of the parties subsequent to the termination of Contract.
- 8.5.4Provided that no arbitration proceedings shall be commenced on any claim or dispute where notice of a claim or dispute has not been given by the applying party within ninety days of the occurrence or discovery of the matter or issue giving rise to the dispute.
- 8.5.5Notwithstanding the issue of a notice as stated above, the arbitration of such a claim or dispute shall not commence unless an attempt has in the first instance been made by the parties to settle such claim or dispute amicably with or without the assistance of third parties. Proof of such attempt shall be required.
- 8.5.6The Arbitrator shall, without prejudice to the generality of his powers, have powers to direct such measurements, computations, tests or valuations as may in his opinion be desirable in order to determine the rights of the parties and assess and award any sums which ought to have been the subject of or included in any certificate.
- 8.5.7The Arbitrator shall, without prejudice to the generality of his powers, have powers to open up, review and revise any certificate, opinion, decision, requirement or notice and to determine all matters in dispute which shall be submitted to him in the same manner as if no such certificate, opinion, decision requirement or notice had been given.
- 8.5.8The award of such Arbitrator shall be final and binding upon the parties.

#### 8.6 Failure to Comply with Arbitrator's Decision

8.6.1 In the event that a Party fails to comply with a final and binding Arbitrator's decision, then the other Party may, without prejudice to any other rights it may have, refer the matter to a competent court of law.

#### 9. The Adjudicator

- 9.1. Should the Adjudicator resign or die, or should the Procuring Entity and the Service Provider agree that the Adjudicator is not functioning in accordance with the provisions of the Contract, a new Adjudicator will be jointly appointed by the Procuring Entity and the Service Provider. In case of disagreement between the Procuring Entity and the Service Provider, within 30 days, the Adjudicator shall be designated by the Appointing Authority **designated in the SCC** at the request of either party, within 14 days of receipt of such request.
- 9.2 The Adjudicator shall be paid by the hour at the rate **specified in the TDS and SCC**, together with reimbursable expenses of the types **specified in the SCC**, and the cost shall be divided equally between the Procuring Entity and the Service Provider, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision will be final and binding.

## SECTION IX - SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract (SCC) shall supplement or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions of the SCC shall prevail over those in the General Conditions of Contract. For the purposes of clarity, any referenced GCC clause numbers are indicated in the left column of the SCC.

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract	
1.1(a)	The Adjudicator is NCIA	
1.1(w)	Project Manager is	
1.1(e)	The contract name is: Servicing & Maintenance of pumps, motors & controls	
<b>1.1(h)</b>	The Procuring Entity is: Thika Water and Sewerage Company Ltd (THIWASCO)	
<b>1.1</b> (m)	The Member in Charge is	
1.1(p)	The Service Provider is	
1.4	The addresses are: Procuring Entity: Thika Water & Sewerage Company Ltd Attention: Managing Director	
	Service Provider:	
1.6	The Authorized Representatives are: For the Procuring Entity: Managing Director, Chief Manager Technical services and Mechatronics engineer Manger For the Service Provider:	
2.1	The date on which this Contract shall come into effect is	
2.2.2	The Starting Date for the commencement of Services is: 7 days after contract signing	
2.3	The Intended Completion Date is <i>1 year after contract signing</i> .	
2.5.3	If the value engineering proposal is approved by the Procuring Entity the amount to be paid to the Service Provider shall be 50% of the reduction in the Contract Price.	
3.2.3	Activities prohibited after termination of this Contract are:	
3.4	The risks and coverage by insurance shall be:       (i)     Third Party motor vehicle	
3.5(d)	The other actions are]	
3.7	Restrictions on the use of documents prepared by the Service Provider are: as per the ones mentioned	

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract	
3.8.1	The liquidated damages rate is 0.01% per day	
	The maximum amount of liquidated damages for the whole contract is 10% percent of the fina Contract Price.	
3.8.3	The percentage to be used for the calculation of Lack of performance Penalty(ies) is $0.01\%$ per day	
5.1	The assistance and exemptions provided to the Service Provider are: No Exemptions	
6.2(a)	The amount in Kenya Shillings: this is a framework contract therefore the contract price is not certain.	
6.3.2	The performance incentive paid to the Service Provider shall be: None	
6.4	Payments shall be made according to the following schedule:	
	After receipt of an acceptable invoice from the contractor after works performed.	
6.5	Payment shall be made within 60 days of receipt of the invoice and the relevant documents.	
6.6.1	Price adjustment is not permitted	
7.1	The principle and modalities of inspection of the Services by the Procuring Entity are as follows: whether the equipment has been reinstated back to its normal working conditions after repairs/maintenance.	
9.1	The designated Appointing Authority for a new Adjudicator is Chartered institute of arbitrators Kenya chapter	
9.2	The Adjudicator is as will be agreed by both parties	

#### Appendices

#### **Appendix A - Description of the Services**

Give detailed descriptions of the Services to be provided, dates for completion of various tasks, place of performance for different tasks, specific tasks to be approved by Procuring Entity, etc.

#### **Appendix B - Schedule of Payments and Reporting Requirements**

List all milestones for payments and list the format, frequency, and contents of reports or products to be delivered; persons to receive them; dates of submission; etc. If no reports are to be submitted, state here "Not applicable."

#### **Appendix C - Subcontractors**

*List under: C-1 List of approved Subcontractors (if already available); same information with respect to their Personnel as in C-1.* 

#### Appendix D – Breakdown of Contract Price List here the elements of cost used to

arrive at the breakdown of the lump-sum price. This appendix will exclusively be used for determining remuneration for additional Services.

#### Appendix E - Services and Facilities Provided by the Procuring Entity

#### **Appendix F - Framework Agreement**

1.1 The Parties shall enter into this contract as a Framework Agreement within 28 days after the Contractor receives the Letter of Acceptance, unless the Particular Conditions establish otherwise. The Framework Agreement shall be based upon FORM No. 3 – FRAMEWORK AGREEMENT annexed to the Particular Conditions. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Framework Agreement shall be borne by the Procuring Entity.

1.2 The Framework Agreement establishes the terms and conditions that will govern the contract awarded during the term of the Framework Agreement. The Framework Agreement establishes for the procurement works by package as and when required, over the specified period of time. The Framework Agreement does not commit a Procuring Entity to procure, nor a Firm to supply. The Framework Agreement allows the Procuring Entity to call the Contractor to commence the works on a particular package in a specified location within the duration of the agreement.

1.3 This Framework Agreement does not guarantee the contractor of being called for a contract to start and no commitment is made with regard to possible number of packages to carry out.

1.4 This Framework Agreement does exclude the Procuring Entity from the right to procure the same Works from other firms.

1.5 This Framework Agreement does not stop the Procuring Entity from removing the contractor from the same Agreement.

1.6 FAs shall be established for a maximum period of three (3) years. The Procuring Entity may with the Consent of the Contractor extend this Agreement where the agreement period is less than three (3) years, if the initial engagement has been satisfactory.

**1.7** Call-off Contracts; for work on a package to start, the Procuring Entity shall issue a notice of acceptance of a package requesting the contractor to furnish a Performance Security and to start the works thereafter, and providing the contractor with details of location where the works, are to be carried out. The call-off statement shall specify the objectives, tasks, deliverables, timeframes and price or price mechanism. The price for individual call-off contracts

shall be based on the prices detailed in the Framework Agreement.

Names of all Service Lines and Packages awarded to the Tenderer.

Description and No of Service Line or Package	Name of Tenderer	Address of the Tenderer	Awarded Tender price

### **Section X - Contract Forms**

#### **Table of Forms**

- 1. PERFORMANCE SECURITY OPTION 1– (Unconditional Demand Bank Guarantee)
- 2 PERFORMANCE SECURITY OPTION 2– (Performance Bond)
- 3. ADVANCE PAYMENT SECURITY [Demand Bank Guarantee]
- 4. BENEFICIAL OWNERSHIP DISCLOSURE FORM
# FORM NO. 1 - PERFORMANCE SECURITY - (Unconditional Demand Bank Guarantee)

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: \_\_\_\_\_[insert name and Address of Procuring

Entity / Date:\_\_\_\_\_[Insert date of issue]

PERFORMANCE GUARANTEE No.:

Guarantor: [Insert name and address of place of issue, unless indicated in the letterhead]

- 2. Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.
- 3. At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of \_\_\_\_\_(), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.
- 4. This guarantee shall expire, no later than the......Day of.......Day of......2, and any demand for payment under it must be received by us at this office indicated above on or before that date.
- 5. The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

[Name of Authorized Official, signature(s) and seals/stamps]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

## FORM No. 2 - PERFORMANCE SECURITY OPTION 2 - (Performance Bond)

[Note: Procuring Entities are advised to use Performance Security – Unconditional Demand Bank Guarantee instead of Performance Bond due to difficulties involved in calling Bond holder to action]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary:	[insert name and Address of Procuring
Entity/ Date:	[Insert date of issue]
PERFORMANCE BOND No.:	

Guarantor: [Insert name and address of place of issue, unless indicated in the letterhead]

- (hereinafter 1. By this Bond Principal called "the as Contractor") and *]* as Surety (hereinafter called "the Surety"), are held and firmly bound unto 1 as Obligee (herein after called "the Procuring Entity") in the amount of\_\_\_\_\_ for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.
- 2. WHEREAS the Contractor has entered into a written Agreement with the Procuring Entity dated the \_\_\_\_\_\_Day of \_\_\_\_\_, 20, for \_\_\_\_\_\_in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are herein after referred to as the Contract.
- 3. NOW, THEREFORE, the Condition of this Obligation is such that, if the Contractor shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise, it shall remain in full force and effect. Whenever the Contractor shall be, and declared by the Procuring Entity to be, in default under the Contract, the Procuring Entity having performed the Procuring Entity's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:
  - 1) Complete the Contract in accordance with its terms and conditions; or
  - 2) Obtain a tender or tenders from qualified tenderers for submission to the Procuring Entity for completing the Contract in accordance with its terms and conditions, and upon determination by the Procuring Entity and the Surety of the lowest responsive Tenderers, arrange for a Contract between such Tenderer, and Procuring Entity and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the Balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by Procuring Entity to Contractor under the Contract, less the amount properly paid by Procuring Entity to Contractor; or
  - 3) Pay the Procuring Entity the amount required by Procuring Entity to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.
- 4. The Surety shall not be liable for a greater sum than the specified penalty of this Bond.
- 5. Any suit under this Bond must be instituted before the expiration of one year from the date of the issuing of the Taking-Over Certificate. No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Procuring Entity named herein or the heirs, executors, administrators, successors, and assigns of the Procuring Entity.
- 6. In testimony whereof, the Contractor has hereunto set his hand and affixed his seal, and the Surety has caused

these presents to be	sealed with his corpo	orate seal duly attested by the signature of his legal representative,
this day	of	20
SIGNED ON		on behalf of
By		in the capacity
of In the presence of		SIGNED
ON		on behalf of
By		in the capacity of
In the presence of		

## FORM NO. 3 - ADVANCE PAYMENT SECURITY [Demand Bank Guarantee]

[Guarantor letterhead or SWIFT identifier

code] [Guarantor letterhead or SWIFT

*identifier code]* 

 Beneficiary:
 [Insert name and Address of Procuring

 Entity] Date:
 [Insert date of issue]

### ADVANCE PAYMENT GUARANTEE No.: [Insert guarantee reference number]

Guarantor: [Insert name and address of place of issue, unless indicated in the letterhead]

- 1. We have been informed that \_\_\_\_\_\_(herein after called "the Applicant") has entered into Contract No. \_\_\_\_\_\_dated \_\_\_\_\_ with the Beneficiary, for the execution of (herein after called" the Contract").
- 2. Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum \_\_\_\_\_() is to be made against an advance payment guarantee.
- 3. At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of \_\_\_\_\_()<sup>1</sup> upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:
  - a) Has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or
  - b) Has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.
- 4. A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been credited to the Applicant on its account number\_\_\_\_\_\_at\_\_.
- 5. The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less provisional sums, has been certified for payment, or on the day of, 2,<sup>2</sup> whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.
- 6. The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months] [one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.

[Name of Authorized Official, signature(s) and seals/stamps]

### FORM NO. 4 BENEFICIAL OWNERSHIP DISCLOSURE FORM

## (Amended and issued pursuant to PPRA CIRCULAR No. 02/2022)

#### INSTRUCTIONS TO TENDERERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE FORM

This Beneficial Ownership Disclosure Form ("Form") is to be completed by the successful tenderer pursuant to Regulation 13 (2A) and 13 (6) of the Companies (Beneficial Ownership Information) Regulations, 2020. In case of joint venture, the tenderer must submit a separate Form for each member. The beneficial ownership information to be submitted in this Form shall be current as of the date of its submission.

For the purposes of this Form, a Beneficial Owner of a Tenderer is any natural person who ultimately owns or controls the legal person (tenderer) or arrangements or a natural person on whose behalf a transaction is conducted, and includes those persons who exercise ultimate effective control over a legal person (Tenderer) or arrangement.

Tender Reference No.:		[insert identification
no] Name of the Tender Title/Descript	ion:	[insert name of the
assignment] to:	[insert complete name of Procuring Er	ntity]

In response to the requirement in your notification of award dated *[insert date of notification of award]* to furnish additional information on beneficial ownership: *[select one option as applicable and delete the options that are not applicable]* 

I) We here by provide the following beneficial ownership information.

Details of beneficial ownership

	Details of all Benefici	al Owners	% of shares a person holds in the company Directly or indirectly	% of voting rights a person holds in the company	Whether a person directly or indirectly holds a right to appoint or remove a member of the board of directors of the company or an equivalent governing body of the Tenderer (Yes / No)	Whether a person directly or indirectly exercises significant influence or control over the Company (tenderer) (Yes / No)
	Full Name		Directly	Directly	1. Having the right to	1. Exercises
1.	National identity card number or Passport number		% of shares Indirectly % of shares	<pre>% of voting rights Indirectly % of voting rights</pre>	appoint a majority of the board of the directors or an equivalent governing body of the Tenderer: Yes No 2. Is this right held directly or	influence or control over the Company body of the Company (tenderer)
	Personal Identification Number (where applicable)					
	Nationality				indirectly?:	
	Date of birth [ <i>dd/mm/yyyy</i> ]				Direct	2. Is this influence or
	Postal address					exercised
	Residential address				To diverse	directly or
	Telephone number					mairectry?
	Email address					Direct
	Occupation or profession					

	Details of all Beneficial C	Dwners	% of shares a person holds in the company Directly or indirectly	% of voting rights a person holds in the company	Whether a person directly or indirectly holds a right to appoint or remove a member of the board of directors of the company or an equivalent governing body of the Tenderer (Yes / No)	Whether a person directly or indirectly exercises significant influence or control over the Company (tenderer) (Yes / No) Indirect
2.	Full NameNational identity card number or Passport numberPersonal Identification Number (where applicable)Nationality(ies)Date of birth [dd/mm/yyyy]Postal addressResidential addressTelephone numberEmail addressOccupation or profession		Directly of shares	Directly % of voting rights Indirectly % of voting rights	<ul> <li>1. Having the right to appoint a majority of the board of the directors or an equivalent governing body of the Tenderer: Yes No</li> <li>2. Is this right held directly or indirectly?:</li> <li>Direct</li></ul>	<ol> <li>Exercises significant influence or control over the Company body of the Company (tenderer) YesNo </li> <li>Is this influence or control exercised directly or indirectly?</li> <li>Direct</li> <li>Indirect</li> </ol>
3. e.t .c						

- II) Am fully aware that beneficial ownership information above shall be reported to the Public Procurement Regulatory Authority together with other details in relation to contract awards and shall be maintained in the Government Portal, published and made publicly available pursuant to Regulation 13(5) of the Companies (Beneficial Ownership Information) Regulations, 2020.(Notwithstanding this paragraph Personally Identifiable Information in line with the Data Protection Act shall not be published or made public). Note that Personally Identifiable Information (PII) is defined as any information that can be used to distinguish one person from another and can be used to deanonymize previously anonymous data. This information includes National identity card number or Passport number, Personal Identification Number, Date of birth, Residential address, email address and Telephone number.
- III) In determining who meets the threshold of who a beneficial owner is, the Tenderer must consider a natural person who in relation to the company:
  - (a) holds at least ten percent of the issued shares in the company either directly or indirectly;
  - (b) exercises at least ten percent of the voting rights in the company either directly or indirectly;

- (c) holds a right, directly or indirectly, to appoint or remove a director of the company; or
- (d) exercises significant influence or control, directly or indirectly, over the company.

IV) What is stated to herein above is true to the best of my knowledge, information and belief.

Name of the Tenderer: ......\*[insert complete name of the Tenderer]\_\_\_\_\_

Name of the person duly authorized to sign the Tender on behalf of the Tenderer: \*\* [insert complete name of person duly authorized to sign the Tender]

Signature of the person named above: ..... [insert signature of person whose name and capacity are shown above]

Date this ...... [insert date of signing] day of...... [Insert month], [insert year]

#### Bidder Official Stamp