TENDER FOR
CONNECTION OF ADDITIONAL WELLS TO THE MENENGAI 105Mwe STEAM GATHERING SYSTEM (EPC)

TENDER NO: GDC/GRM/OT/005/2024:2025

CLOSING DATE AND TIME: 3RD OCTOBER 2024 AT 1100 HOURS EAST AFRICAN TIME (11.00AM)

Geothermal Development Company Ltd (GDC)
P.O. Box 100746-00101
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Tel: +254 719 036000;
020 2427516
Website: www.gdc.co.ke

TABLE OF CONTENTS

PREFACE v

APPENDIX TOTHE PREFACE vii

GUIDELINES FOR PREPARATION OF TENDER DOCUMENTS vii

1. GENERAL vii
2. PART 1 - TENDERING PROCEDURES vii
3. PART 2 - PROCUREMENT ENTITY'S REQUIREMENTS viii
4. PART 3 - CONDITIONS OF CONTRACT ANDCONTRACTFORMS viii

INVITATION TOTENDER x

Invitation To Tender

SECTION I - INSTRUCTIONSTOTENDERERS 1

A. General 1

1. Scope of Tender 1
2. Definitions 1
3. Fraud and Corruption 1
4. Eligible Tenderers 1
5. Qualification of the Tenderer 3

B. **Contents of Tendering Document** 3

6. Sections of Tendering Document 3
7. Site Visit 4
8. Pre-Tender Meeting and a pre-arranged pretender visit of the site of the works 4
9. Clarification of Tender Documents 4
10. Amendment of Tendering Document 5

C. **Preparation of Tenders** 5

11. Cost of Tendering 5
12. Language of Tender 5
13. Documents Comprising the Tender 5
14. Form of Tender and Schedules 5
15. Alternative Tenders 6
16. Tender Prices and Discounts 6
17. Currencies of Tender and Payment 6
18. Documents Establishing Conformity of Services 7
19. Documents Establishing the Eligibility and Qualifications of the Tenderer 7
20. Period of Validity of Tenders 8
21. Tender Security 8
22. Format and Signing of Tender 9

D. **Submission and Opening of Tenders** 9

23. Sealing and Marking of Tenders 9

24. Deadline for Submission of Tenders 10
25. Late Tenders 10
26. Withdrawal, Substitution and Modification of Tenders 10
27. Tender Opening 10
E. Evaluation and Comparison of Tenders 12
28. Confidentiality 12
29. Clarification of Tenders 12
30. Deviations, Reservations, and Omissions 12
31. Determination of Responsiveness 12
32. Non-material Non-conformities 13
33. Correction of Arithmetical Errors 13
34. Break down of the Tender Price 13
35. Conversion to Single Currency 14
36. Margin of Preference and Reservations 14
36. Nominated Subcontractors 14
37. Evaluation of Tenders 14
38. Comparison of Tender Prices 15
39. Abnormally Low Tenders 15
40. Abnormally High Tenders 16
41. Qualifications of the Tenderer 16
42. Lowest Evaluated Tender 16
42. Procuring Entity's Right to Accept any Tender, and to Reject any or All Tenders 17
45. Standstill Period 17
46. Debriefing by the Procuring Entity 17
47. Letter of Award 17
48. Signing of Contract 17
49. Performance Security 18
49. Publication of Procurement Contract 18
50. Procurement Related Complaints and Administrative Review 18

Section II - Tender Data Sheet (TDS) 19

SECTION III - EVALUATION ANDQUALIFICATION CRITERIA 23

1. General Provisions 23
2. Preliminary examination for Determination of Responsiveness 23
3. Evaluation of the Technical Proposal 23
4. Tender Evaluation(ITT36) 25
5. Multiple Contracts (if applicable) 26
6. Alternative Tenders(ITT13.1) 26
7. MARGIN OF PREFERENCE 26
8. Post qualification and Contract ward (ITT39) 27

SECTION IV –TENDERINGFORMS 31

QUALIFICATIONFORMS 31

1. FOREIGN TENDERERS40% RULE 31
2. FORM EQU: EQUIPMENT 32
3. FORM PER -1 33
4. FORM PER-2: 34
5. TENDERERS QUALIFICATIONWITHOUTPREQUALIFICATION 36

OTHER FORMS 45

6. FORM OFTENDER 45

TENDERER'S ELIGIBILITY- CONFIDENTIALBUSINESS QUESTIONNAIRE 48
CERTIFICATE OF INDEPENDENTTENDERDETERMINATION 51
SELF-DECLARATION FORM 52
APPENDIX 1- FRAUDANDCORRUPTION 55
FORM OFTENDER-SECURING DECLARATION 57
FORM OF TENDER SECURITY (Insurance Guarantee) 58

PART II - PROCURING ENTITY'S INFRASTRUCTURAL FACILITY REQUIREMENTS 61

SECTION VII - PROCURINGENTITY'SREQUIREMENTS 62

1. Notes on preparing the Procuring Entity's Requirements 62
2. Scope of the Works *[Insert scope]* *65*
3. Site Information 65
4. Specifications 65
5. Drawings *(Tenderer to prepare drawings to demonstrate the intended works)* *65*
6. Contractor's Documents 66
7. Supplementary Information *(Procuring Entity to add if any).* *66*

PART III - THE CONDITIONS OF CONTRACT ANDCONTRACTFORMS 67

Section VIII - General Conditions OFCONTRACT(GCC) 67

1. GENERALPROVISIONS 67
2. THE PROCURING ENTITY 74
3. The Project Manager 75
4. The Contractor 77
5. Nominated Subcontractors 85
6. Staff and Labour 86
7. Plant, Materials and Workmanship 89
8. Commencement, Delays and Suspension 91
9. Tests on Completion 94
10. Procuring Entity's Taking Over 95
11. Defects Liability 97
12. Measurement and Evaluation 99

13. Variations and Adjustments 100
14. Contract Price and Payment 104
15. Termination by Procuring Entity 110
16. Suspension and Termination by Contractor 112
17. Risk and Responsibility 113
18. Insurance 115
19. Force Majeure 118
20. Settlement of Claims and Disputes 120

Section IX - Particular Conditions of Contract 124

Section X - Contract Forms 126

FORM No. 1 - NOTIFICATION OF INTENTION TO AWARD 127
FORM No. 2 – REQUEST FOR REVIEW 130
FORM No. 3 - LETTER OF AWARD 130
FORM No. 4 -CONTRACTAGREEMENT 131
FORM No. 5 - PERFORMANCE SECURITY [Option 1 - Unconditional Demand Bank Guarantee] 132
FORM No. 6 - PERFORMANCE SECURITY [Option 2–Performance Bond] 133
FORM No. 7 - ADVANCEPAYMENTSECURITY 134
FORM No. 8 - RETENTIONMONEYSECURITY 135
FORM No. 9 - BENEFICIAL OWNERSHIP DISCLOSURE 135

INVITATION TO TENDER

PROCURING ENTITY - GEOTHERMAL DEVELOPMENT COMPANY LTD

CONTRACT NAME AND DESCRIPTION: TENDER FOR CONNECTION OF ADDITIONAL WELLS TO THE MENENGAI 105Mwe STEAM GATHERING SYSTEM (EPC)

Geothermal Development Company invites sealed tenders for Connection of Additional Wells to the Menengai 105Mwe Steam Gathering System (EPC)

Further information regarding the Tender Documents can be obtained from the office of the Manager, Supply Chain at Kawi House Office, located at South C Bellevue, Off Mombasa Road, Red Cross Road between 9.00am and 4.00pm during weekdays.

A complete set of tender documents may be purchased or obtained by interested tenders upon payment of a non- refundable fees of Kshs 1000.00 in cash or Banker's Cheque and payable to GDC Accounts Office. Tender documents may be obtained electronically from the Website www.gdc.co.ke or www.tenders.go.ke. Tender documents obtained electronically will be free of charge.

For clarification and addendum, may use GDC email: procurement@gdc.co.ke.

All Tenders must be accompanied by an original tender security in the amount of Kshs. 2,000,000.00 issued by a local bank or bank with a local correspondence valid for 180 days from the date of tender opening.

All submitted tender documents shall be serialized in a chronologically.

Completed tenders are to be enclosed in plain sealed envelopes marked with tender name and tender reference number and be deposited in the Tender Box at GDC Kawi House Office Ground Floor, located at South C Bellevue, Off Mombasa Road, Red Cross Road, or be addressed to;

THE MANAGING DIRECTOR,
GEOTHERMAL DEVELOPMENT COMPANY LTD
P.O. BOX 100746 – 00101
NAIROBI, KENYA

So as to be received on or before **3rd October 2024 at 11.00 HRS E.A TIME.**

Electronic Tenders will not be permitted.

Tenders will be opened immediately after the deadline date and time specified above . Tenders will be opened in the presence of the bidders who choose to attend at GDC Kawi House Office Ground Floor.

Mandatory site visit will be held at GDC Menengai Geothermal Field on Wednesday 18th September at 9.30 am. Bidders are required to assemble at GDC Polo Centre Offices then proceed to Menengai Geothermal Project.

NB: - Bidders shall be responsible for their own transport logistics during the site visit.

MANAGER, SUPPLY CHAIN

PART 1 - TENDERING PROCEDURES

SECTION I - INSTRUCTIONS TO TENDERERS

A General Provisions

1. Scope of Tender

The Procuring Entity as defined in the Appendix to Conditions of Contract invites tenders for Works Contract as described in the tender documents. The name, identification, and number of lots (contracts) of this Tender Document are **specified in the TDS.**

2. Fraud and Corruption

2.1 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.

2.2 The Procuring Entity requires compliance with the provisions of the Competition Act 2010, 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.

2.3 Tenderers shall permit and shall cause their agents (whether declared or not), subcontractors, sub-consultants, service providers, suppliers, and their personnel, to permit the Procuring Entity to inspect all accounts, records, and other documents relating to tender proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Procuring Entity.

3 Eligible Goods, Equipment, and Services

3.1 Goods, equipment, and services to be supplied under the Contract may not have their origin in any country that is not eligible under ITT3.9. At the Procuring Entity's request, Bidders may be required to provide evidence of the origin of Goods, equipment, and services.

3.2 Any 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.

4 Tenderer's Responsibilities

4.1 The tenderer shall bear all costs associated with the preparation and submission of his/her tender, and the Procuring Entity will in no case be responsible or liable for those costs.

4.2 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Works and its surroundings, and obtain all information that may be necessary for preparing the tender and entering into a contract for construction of the Works. The costs of visiting the Site shall beat the tenderer's own expense.

4.3 The Tenderer and any of its personnel or agents will be granted permission by the Procuring Entity to enter upon its premises and lands for the purpose of such visit. The Tenderer shall indemnify the Procuring Entity against all liability arising from death or personal injury, loss of or damage to property, and any other losses and expenses incurred as a result of the inspection.

4.4 The tenderer shall provide in the Form of Tender and Qualification Information, a preliminary description of the proposed work method and schedule, including charts, as necessary or required.

B. Contents of Tender Documents

5 Sections of Tender Document

5.1 The tender document consists of Parts 1, 2, and 3, which includes all the sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITT 10.

5.1.1 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

5.1.2 PART 2 Works Requirements

i) Section V- Specifications

ii) Section VI- Drawings

5.1.3 PART 3 Conditions of Contract and Contract Forms

i) Section VII- General Conditions of Contract (GCC)

ii) Section VII– Special Conditions of Contract (SC)

5.2 The Invitation to Tender Document Notice issued by the Procuring Entity is not part of the Tender document.

5.3 Unless obtained directly from the Procuring Entity, the Procuring Entity is not responsible for the completeness of the Tender document, responses to requests for clarification, the minutes of the pre-Tender meeting (if any), or Addenda to the Tender document in accordance with ITT 10. In case of any contradiction, documents obtained directly from the Procuring Entity shall prevail.

5.4 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the Tender Document and to furnish with its Tender all information and documentation as is required by the Tender document

6 Site Visit

6.1 The Tenderer, at the Tenderer's own responsibility and risk, is encouraged to visit and examine the proposed project 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.

7 Pre-Tender Meeting and a pre-arranged pretender visit of the site of the works

7.1 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.

7.2 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.

7.3 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 ITT6.3. Minutes shall not identify the source of the questions asked.

7.4 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 ITT10 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.

8 Clarification of Tender Documents

8.1 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 ITT8.4. 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.

9 Amendment of Tendering Document

9.1 At any time prior to the deadline for submission of Tenders, the Procuring Entity may amend the Tendering document by issuing addenda.

9.2 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 ITT8.1.

9.3 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 2.

C. Preparation of Tenders

10 Cost of Tendering

10.1 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.

11 Language of Tender

11.1 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 may be in the same language.

12 Documents Comprising the Tender

12.1 The Tender shall comprise the following:

a) Form of Tender prepared in accordance with ITT 14;

b) Schedules of personnel, and work 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) Conformity: a technical proposal in accordance with ITT 18;

h) Any other document required in the **TDS**.

In addition to the requirements under ITT 13.1, Tenders submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter 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 serialize pages of all tender documents submitted.

13 Form of Tender and Schedules

13.1 The Form of Tender and Schedules, 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 22.3. All blank spaces shall be filled in with the information requested. The Tenderer shall chronologically serialize all pages of the tender documents submitted.

13.2 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 Alternative Tenders

14.1 Unless otherwise specified in the **TDS**, alternative Tenders shall not be considered.

14.2 When alternative times for completion are explicitly invited, a statement to that effect **will be included in the TDS**, and the method of evaluating different alternative times for completion will be described in Section III, Evaluation and Qualification Criteria.

14.3 Except as provided under ITT 15.4 below, Tenderers wishing to offer technical alternatives to the requirements of the Tender Documents must first price the Procuring Entity's design as described in the Tender Documents and shall further provide all information necessary for a complete evaluation of the alternative by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the Tenderer with the Winning Tender conforming to the basic technical requirements shall be considered by the Procuring Entity.

14.4 When specified in the **TDS**, Tenderers are permitted to submit alternative technical solutions for specified parts of the Works, and such parts **will be identified in the TDS**, as will the method for their evaluation and described in Section VII, Works' Requirements.

15 Tender Prices and Discounts

15.1 The prices and discounts (including any price reduction) quoted by the Tenderer in the Form of Tender shall conform to the requirements specified below.

15.2 The Tenderer shall price for all items of the Works, including design, management and quality control costs and shall be assumed to have included in the tender price all associated costs, including costs to meet Public Authorities' requirements.

15.3 The price to be quoted in the Form of Tender, in accordance with ITT 14.1, shall be the total price of the Tender, excluding any discounts offered.

15.4 The Tenderer shall quote any discounts and the methodology for their application in the Form of Tender, in accordance with ITT 14.1.

15.5 It will be specified in the **TDS** if the rates and prices quoted by the Tenderer are or are not subject to

adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, except in cases where the contract is subject to fluctuations and adjustments, not fixed price. In such a case, the Tenderer shall furnish the indices and weightings for the price adjustment formulae in the Schedule of Adjustment Data and the Procuring Entity may require the Tenderer to justify its proposed indices and weightings.

15.6 Where tenders are being invited for individual lots (contracts)or for any combination of lots (packages), tenderers wishing to offer discounts for the award of more than one Contract shall specify in their Tender the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITT 16.4, provided the Tenders for all lots (contracts) are opened at the same time.

15.7 All duties, taxes, and other levies payable by the Contractor 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 rates and prices and the total Tender Price submitted by the Tenderer.

16 Currencies of Tender and Payment

16.1 The currency (ies) of the Tender and the currency of payments shall be the same**.**

16.2 Tenderers shall quote entirely in Kenya Shillings or any freely convertible currency.

16.2.1 A Tenderer expecting to incur expenditures in other currencies for inputs to the Works supplied from outside Kenya (referred to as "the foreign currency requirements") shall indicate so in the Financial Proposal the percentage (s) of the Tender Price (excluding Provisional Sums), needed by the Tenderer for the payment of such foreign currency requirements, limited to no more than two foreign currencies.

16.2.2 The rates of exchange to be used by the Tenderer in arriving at the local currency equivalent and the percentage (s) mentioned in (a) above shall be specified by the Tenderer in the **TDS**, and shall apply for all payments under the Contract so that no exchange risk will be borne by the successful Tenderer.

16.3 Tenderers may be required by the Procuring Entity to justify, to the Procuring Entity's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data in the Appendix to Tender are reasonable, in which case a detailed breakdown of the foreign currency requirements shall be provided by Tenderers.

17 Documents Comprising the Technical Proposal

17.1 The Tenderer shall furnish a technical proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV, Tender Forms, insufficient detail to demonstrate the adequacy of the Tenderer's proposal to meet the work's requirements and the completion time.

18 Documents Establishing the Eligibility and Qualifications of the Tenderer

18.1 Tenderers shall complete the Form of Tender, included in Section IV, Tender Forms, to establish Tenderer's eligibility in accordance with ITT 4.

18.2 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract the Tenderer shall provide the information requested in the corresponding information sheets included in Section IV, Tender Forms.

18.3 If a margin of preference applies as specified in accordance with ITT 36.1, national tenderers, individually or in joint ventures, applying for eligibility for national preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITT 36.1.

18.4 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 particular contractor or group of contractors 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.

18.5 The purpose of the information described **in ITT 19.2** 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.

18.6 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 ITT19.5. 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.

18.7 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.

18.8 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.

18.9 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 persons have committed any criminal offence.

18.10 If a tenderer submits information pursuant to these requirements that is in complete, inaccurate or out-of-date, or attempts to obstruct the verification process, then the consequences ITT19.9 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 Period of Validity of Tenders

19.1 Tenders 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 (as prescribed by the Procuring Entity in accordance with ITT 24.1). A tender valid for a shorter period shall be rejected by the Procuring Entity as non-responsive.

19.2 In 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 21, it shall also be extended for thirty (30) days beyond the deadline of the extended validity 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 26.3.

20 Tender Security

20.1 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**. A Tender-Securing Declaration shall use the form included in Section IV, Tender Forms.

20.2 If a Tender Security is specified pursuant to ITT 21.1, the Tender Security shall be a demand guarantee 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, and from a reputable source, and an eligible country.

20.3 If an unconditional bank guarantee is issued by a bank located outside Kenya, the issuing bank shall have a correspondent bank located in Kenya to make it enforceable. The Tender Security shall be valid for thirty (30) days beyond the original validity period of the Tender, or beyond any period of extension if requested under ITT 24.2.

20.4 If a Tender Security or Tender-Securing Declaration is specified pursuant to ITT 21.1, any Tender not accompanied by a substantially responsive Tender Security or Tender-Securing Declaration shall be rejected by the Procuring Entity as non-responsive.

20.5 The Tender Security shall be returned/release as promptly as possible

a. The procurement proceedings are terminated;
b. The procuring entity determines that none of the submitted tenders is responsive;
c. A bidder declines to extend the tender validity.
d. Once the successful Tenderer has signed the Contract and furnished the required Performance Security.

21.6 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 on the Form of Tender; or

b) If the successful Tenderer fails to:

i) Sign the Contract in accordance with ITT 50; or

ii) Furnish a performance security in accordance with ITT 51.

21.7 Where the Tender-Securing Declaration is executed the Procuring Entity will recommend to the PPRA that PPRA debars the Tenderer from participating in public procurement as provided in the law.

21.8 The Tender Security or the Tender-Securing Declaration of a JV shall 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 the Tender-Securing Declaration shall be in the names of all future members as named in the letter of intent referred to in ITT 4.1 and ITT 13.2.

21.9 A tenderer shall not issue a tender security to guarantee itself.

21 Format and Signing of Tender

21.1 The Tenderer shall prepare one original of the documents comprising the Tender as described in ITT 13and clearly mark it "ORIGINAL." Alternative Tenders, if permitted in accordance with ITT 15, shall be clearly marked "ALTERNATIVE." In addition, the Tenderer shall submit copies of the Tender, in the number **specified in the TDS** and clearly mark them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

21.2 Tenderers shall mark as "CONFIDENTIAL" all information in their Tenders which is confidential to their business. This may include proprietary information, trade secrets, or commercial or financially sensitive information.

21.3 The original and all copies of the Tender shall be typed or written in indelible ink and shall be signed by a person 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.

21.4 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.

21.5 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

22 Sealing and Marking of tenders

22.1 The Tender shall deliver the Proposals (technical and Financial) 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 "DO NOT 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:

22.2 In the single sealed envelope, or in a single sealed package, or in a single sealed container the following documents shall been closed and shall be addressed as follows:

a. in an envelope or package or container marked "ORIGINAL", all documents comprising the Technical Proposal, and

b. in an envelope or package or container marked "COPIES", all required copies of the Technical Proposal; and

c. in an envelope marked "ORIGINAL" the Form of Tender; and The inner envelopes or packages or containers shall:

   i. bear the name and address of the Procuring Entity.

   ii. bear the name and address of the Tender; and

   iii. bear the name and Reference number of the Contract.

22.3 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 proposal. Tenders that are misplaced or opened prematurely will not be accepted.

22.4 The Proposal or its modifications must be sent to the address indicated in the **Data Sheet** and received by the Procuring Entity no later than the deadline indicated in the Data Sheet, or any extension to this deadline. Any Proposal or its modification received by the Procuring Entity after the deadline shall be declared late and rejected, and promptly returned unopened.

23 Deadline for Submission of Tenders

23.1 Tenders must be received by the Procuring Entity at the address **specified in the TDS** and no later than the date and time also **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**.

23.2 The Procuring Entity may, at its discretion, extend the deadline for the submission of Tenders by amending the Tender Documents in accordance with ITT 8, 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.

24 Late Tenders

24.1 The Procuring Entity shall not consider any Tender that arrives after the deadline for submission of tenders, in accordance with ITT 24. 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.

25 Withdrawal, Substitution, and Modification of Tenders

25.1 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 in accordance with ITT 22.3, (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:

a. prepared and submitted in accordance with ITT 22 and ITT 23 (except that withdrawals notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and

b. received by the Procuring Entity prior to the deadline prescribed for submission of Tenders, in accordance with ITT 22.

25.2 Tenders requested to be withdrawn in accordance with ITT 26.1shall be returned unopened to the Tenderers.

25.3 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.

26 Tender Opening

26.1 The Procuring Entity's opening committee shall conduct the opening of the Technical Proposals in the presence of the Tenders representatives who choose to attend. The opening date, time and the address are stated in the **TDS.** The envelopes with the Form of Tender (Financial Proposal) shall remain sealed and shall be securely stored by the Procuring Entity until they are opened.

26.2 At the opening of the Technical Proposals the following shall be read out: (i) the name and the country of the Tender or, in case of a Joint Venture, the name of the Joint Venture, the name of the lead member and the names and the countries of all members; (ii) the presence or absence of a duly sealed envelope of the Form of Tender (Financial Proposal); (iii) any modifications to the Proposal submitted prior to Tender submission deadline; and (iv) any other information deemed appropriate or as indicated in the **TDS**.

26.3 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelopes with the corresponding Tender shall not be opened, but returned to the Tenderer. No Tender withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the

withdrawal and is readout at Tender opening.

26.4 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 readout at Tender opening.

26.5 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 readout at Tender opening.

26.6 Next, all remaining envelopes shall be opened one at a time, reading out: the name of the Tenderer and whether there is a modification; 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.

26.7 Only Tenders, alternative Tenders and discounts that are opened and read out at Tender opening shall be considered further for evaluation.

26.8 At the Tender Opening, the Procuring Entity shall neither discuss the merits of any Tender nor reject any Tender (except for late Tenders, in accordance with ITT 25.1).

26.9 The Procuring Entity shall prepare minutes of the opening of technical proposals that shall include, as a minimum:

a. the name of the Tenderer and whether there is a withdrawal, substitution, or modification; and any discounts offered as a separate letter;

b. presence of a sealed Form of Tender Price;

c. any alternative technical proposals, if any;

d. the presence or absence of a Tender Security, if one was required.

26.10 The Tenderers' representatives who are present shall be requested to sign the minutes. The omission of a Tenderer's signature on the minutes shall not invalidate the contents and effect of the minutes. A copy of the tender opening register shall be distributed to all Tenderers upon request.

26.11 After the technical evaluation is completed, the Procuring Entity shall notify those Tenderers whose Proposals were considered non-responsive to the Tender document for not meeting the minimum qualifying technical score, advising them the following: (i) their Proposal was not responsive to the Tender Document and did not meet the minimum qualifying technical score; (ii) provide information relating to the Tenderer's overall technical score, as well as scores obtained; (iii) their Forms of Tender will be returned unopened after completing the tender process and contract signing; and (iv) notify them of the date, time and location of the public opening of the Forms of Tender (Financial Proposals) and invite them to attend.

26.12 The opening date of the Forms of Tender should allow the Tenders sufficient time to decide for attending the opening and shall be not less than five (5) Business Days from the date of notification of the results of the technical evaluation. Tenderer's attendance at the opening of the Forms of Tender is optional and is at the Tenderer's choice. The Forms of Tender shall be opened publicly by the Procuring Entity's opening committee in the presence of the representatives of the Tenderers who chooses to attend.

26.13 At the opening, the names of the Tenders, and the overall technical scores, shall be read aloud. The Forms of Tender will then be inspected to confirm that they have remained sealed and unopened. These Forms of Tender shall be then opened, and the total prices read aloud and recorded. Upon request, copies of the record shall be sent to all Tenders who submitted Tenders.

E. Evaluation and Comparison of Tenders

27 Confidentiality

27.1 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 Tender process until information on Intention to Award the Contract is transmitted to all Tenderers in accordance with ITT 44.

27.2 Any effort by a Tenderer to influence the Procuring Entity in the evaluation of the Tenders or Contract award decisions may result in the rejection of its tender.

27.3 Not with standing ITT 28.2, from the time of tender opening to the time of contract award, if a tenderer wishes to contact the Procuring Entity on any matter related to the tendering process, it shall do so in writing.

28 Clarification of Tenders

28.1 To assist in the examination, evaluation, and comparison of the tenders, and qualification of the tenderers, the Procuring Entity may, at its discretion, ask any tenderer for a clarification of its tender, given a reasonable time for a response. Any clarification submitted by a tenderer 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 33.

28.2 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.

29 Deviations, Reservations, and Omissions

29.1 During the evaluation of tenders, the following definitions apply:

"Deviation" is a departure from the requirements specified in the tender document;

"Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the tender document; and "Omission" is the failure to submit part or all of the information or documentation required in the Tender document.

30 Determination of Responsiveness

30.1 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 13.

30.2 A substantially responsive Tender is one that meets the requirements of the Tender document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that, if accepted, would:

a. Affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or

b. limit in any substantial way, inconsistent with the tender document, the Procuring Entity's rights or the tenderer's obligations under the proposed contract; or

c. if rectified, would unfairly affect the competitive position of other tenderers presenting substantially responsive tenders.

30.3 The Procuring Entity shall examine the technical aspects of the tender submitted in accordance with ITT 18, to confirm that all requirements of Section VII, Works' Requirements have been met without any material deviation, reservation or omission.

30.4 If a tender is not substantially responsive to the requirements of the tender 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.

31 Non-material Non-conformities

31.1 Provided that a tender is substantially responsive, the Procuring Entity may waive any non-conformities in the tender.

31.2 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 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.

31.3 Provided that a tender is substantially responsive, the Procuring Entity shall rectify quantifiable nonmaterial 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.**

31.4 Provided that the tender is substantially responsive, no correction of errors is expected in this tender.

32 Correction of Arithmetical Errors

32.1 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 any way by any person or entity.

32.2 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, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail.

33 Breakdown of the Tender Price

33.1 The completed Form of Tender shall have a table indicating the a detailed of the Tender Price which must include:

a. Preliminary items such as insurance for works, noticeboards, statutory payments, site office costs, etc.,

b. Monthly cost of design/supervisory staff and site agents (up to contract completion);

c. Monthly cost of major items of equipment (up to contract completion);

d. Cost of the works (a lump sum figure).

e. Any items specified in the **TDS.**

33.2 The Breakdown of the Tender Price will form the basis of the Bills of Quantities and Payment Schedule and will be agreed with the Procuring Entity prior to signing of the contract and it will be part of the Contract Agreement. In addition, the Contract or shall be required to submit non-binding quarterly estimates of the payments which he expects to become due during the execution of the works.

33.3 In preparing the Schedule of Payments, every effort must be taken to ensure that the schedule is not is seriously unbalanced and/or front loaded. If in the Procuring Entity's opinion, the schedule 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 schedule of prices with the scope of works, proposed methodology, schedule and any other requirements of the Contract.

33.4 On award of Contract, within the period specified in the **TDS,** the tenderer will prepare a complete Bills of Quantities for the works in conformity with ITT 31.1 (d) which will form the basis of preparing payment certificates. If in the Procuring Entity's opinion, the pricing in the Bills of Quantities 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 schedule of prices with the scope of works, proposed methodology, schedule and any other requirements of the Contract.

34 Conversion to Single Currency

34.1 For evaluation and comparison purposes, the currency (ies) of the Tender shall be converted into a single currency **as specified in the TDS**.

35 Margin of Preference and Reservations

35.1 A margin of preference may be allowed only when the contract is open to international competitive tendering where foreign contractors are expected to participate in the tendering process and where the contract exceeds the value/threshold specified in the Regulations.

35.2 A margin of preference shall not be allowed unless it is specified so in the **TDS**.

35.3 Contracts procured on basis of international competitive tendering shall not be subject to reservations exclusive to specific groups as provided in ITT36.1.

36 Nominated Subcontractors

36.1 **Unless** otherwise stated **in the TDS,** the Procuring Entity does not in tend to execute any specific elements of the Works by subcontractors selected in advance by the Procuring Entity.

36.2 Tenderers may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified **in the TDS**. Subcontractors proposed by the Tenderer shall be fully qualified for their parts of the Works.

36.3 The subcontractor's qualifications shall not be used by the Tenderer to qualify for the Works unless their specialized parts of the Works were previously designated by the Procuring Entity **in the TDS** as can be met by subcontractors referred to hereafter as 'Specialized Subcontractors', in which case, the qualifications of the Specialized Subcontractors proposed by the Tenderer may be added to the qualifications of the Tenderer.

37 Evaluation of Tenders

37.1 To assist in the examination, and evaluation of Technical Proposals, and qualification of the tenderers, the Procuring Entity may, at its discretion, ask any tenderer for a clarification of its Tender, given a reasonable time for a response. Any clarification submitted by a tenderer 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 any errors discovered by the Procuring Entity in the evaluation of the tenders, in accordance with ITT 33.

37.2 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.

37.3 The Procuring Entity's evaluation committee shall evaluate the Technical Proposals that have passed the eligibility and mandatory criteria, on the basis of their responsiveness to the Tender Documents. The eligibility and mandatory criteria shall include the following and any other that may include in the **Data sheet.**

a) Firm has submitted the required number of copies of the Technical Proposals.

b) Firm has submitted a sealed form of Tender (Financial proposal).

c) The Proposal is valid for the required number of days.

d) The Technical Proposal is signed by the person with power of attorney, without material deviation, reservation, or omission.

e) The Technical Proposal is complete with all the forms and required documentary evidence submitted.

f) Valid Tax Compliance Certificate for Kenyan firms.

g) Key Experts are from eligible countries.

h) A tenderer has not participated in more than one tender, except for alternative tenders if so allowed.

i) The tender is not in solvent, in receivership, bankrupt or in the process of being wound up.

j) The Tenderer, its sub-consultants and experts have not engaged in or been convicted of corrupt or fraudulent practices.

k) The Tenderer is neither precluded from entering into a Contract nor debarred by PPRA.

l) The Tenderer has not proposed employing public officials, civil servants and employees of public institutions.

m) The Tenderer, its sub-consult as and experts have no conflicts of interest.

n) Any other material requirement in the ITT.

37.4 Only Technical proposals of tenderers that pass the preliminary examination will be evaluated. A Proposal shall be rejected at this stage if it does not respond to important aspects of the tender document if it fails to achieve the minimum technical score indicated in the **TDS.**

38 Comparison of Tender Prices

38.1 The Procuring Entity shall use the criteria and methodologies listed in the 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 Lowest Evaluated Tender in accordance with ITT 40.

38.2 To evaluate a Tender, the Procuring Entity shall consider the following:

a) The Tender price, including Provisional Sums, if any;

b) Price adjustment due to unconditional discounts offered in accordance with ITT 16.4;

c) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITT 35;

d) any additional evaluation factors specified **in the TDS** and Section III, Evaluation and Qualification Criteria.

38.3 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.

38.4 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.

38.5 The Procuring Entity shall compare the evaluated costs of all substantially responsive Tenders

established in accordance with ITT 38.2 to determine the Tender that has the lowest evaluated cost.

39 Abnormally Low Tenders

39.1 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.

39.2 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.

39.3 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.

40 Abnormally High Tenders

40.1 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.

40.2 In case of an abnormally high price, the Procuring Entity shall make a survey of the market prices, check if the estimated cost of the contract is correct and review the Tender Documents to check if the specifications, scope of work and conditions of contract are contributory to the abnormally high tenders. The Procuring Entity may also seek written clarification from the tenderer on the reason for the high tender price. The Procuring Entity shall proceed as follows:

i) If the tender price is abnormally high based on wrong estimated cost of the contract, the Procuring Entity may accept or not accept the tender depending on the Procuring Entity's budget considerations.

ii) If specifications, scope of work and/or conditions of contract are contributory to the abnormally high tender prices, the Procuring Entity shall reject all tenders and may retender for the contract based on revised estimates, specifications, scope of work and conditions of contract, as the case may be.

40.3 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.

41 Qualifications of the Tenderer

41.1 The Procuring Entity shall determine to its satisfaction whether the eligible Tenderer has submitted substantially responsive Tender, meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.

41.2 The determination shall be based upon an examination of the documentary evidence of the Tenderer's qualifications submitted by the Tenderer, pursuant to ITT 19.

42 Procuring Entity's Right to Accept Any Tender, and to Reject Any or All Tenders.

The Procuring Entity reserves the right to accept or reject any Tender and to annul the Tender process and reject all Tenders at any time prior to Contract Award, without there by 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

43 Award Criteria

The Procuring Entity shall award the Contract to the most responsive bidder after Evaluation.

44 Notice of Intention to enter into a Contract/Notification of award

44.1 Upon award of the contract and Prior to the expiry of the Tender Validity Period the Procuring Entity shall issue a Notification of Intention to Enter into a Contract/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 Standstill Period; and

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

45 Standstill Period

45.1 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.

45.2 Where a Standstill Period applies, it shall commence when the Procuring Entity has transmitted to each Tenderer the Notification of Intention to Enter in to a Contract with the successful Tenderer.

46 Letter of Award

46.1 Prior to the expiry of the Tender Validity 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 21days of the date of the letter.

47 Signing of Contract

47.1 Upon the expiry of the fourteen days of the Notification of Intention to enter in to contract and upon the Parties meeting their respective statutory requirements, the Procuring Entity shall send the Tenderer the Contract Agreement.

47.2 Within fourteen (14) days of receipt of the Contract Agreement, the Tenderer shall sign, date, and return it to the Procuring Entity.

47.3 The written contract shall be entered into within the period specified in the notification of award and before expiry of the tender validity period

47.4 Notwithstanding ITT 50.2 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Procuring Entity, to Kenya, or to the use of the Information System to be supplied,

47.5 Where such export restrictions arise from trade regulations from a country supplying those Information System, the Tenderer shall not be bound by its Tender, provided that the Tenderer can demonstrate that signing of the Contract Agreement has not been prevented by any lack of diligence on the part of the Tenderer in completing any formalities, including applying for permits, authorizations and licenses necessary for the export of the Information System under the terms of the Contract.

48 Performance Security

48.1 Within twenty-one (21) days of the receipt of the Letter of Acceptance from the Procuring Entity, the Tenderer shall furnish the Performance Security and, any other documents required in the **TDS**, in accordance with the General Conditions of Contract, subject to ITT 38.2 (b), using the Performance Security and other Forms included in Section X, Contract Forms, or another form acceptable to the Procuring Entity. A foreign institution providing a bank guarantee shall have a correspondent financial institution located in Kenya, unless the Procuring Entity has agreed in writing that a correspondent bank is not required.

48.2 Failure of the Tenderer to submit the above-mentioned Performance Security and other documents required in the **TDS**, 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 Lowest Evaluated Tender.

48.3 Performance security shall not be required for contracts estimated to cost less than Kenya shillings five million shillings.

49 Publication of Procurement Contract

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.

50 Procurement Related Complaint and Administrative Review

50.1 The procedures for making Procurement-related Complaints or a request for review shall be specified in the **TDS.**

53.2 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 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.

Reference to ITC Clause	**PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS**
A. General	

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
ITT 1.1	The name of the contract is; **Connection of Additional Wells to the Menengai 105Mwe Steam Gathering System (EPC).** The reference number of the Contract is **GDC/GRM/OT/005/2024-2025** The number and identification of lots (contracts) comprising this Tender – One (1)
ITT 2.3	Firms that provided consulting services for the contract being tendered for are: **None**
ITT 3.1	Maximum number of members in the Joint Venture (JV) shall be: ***Two (2)***
B. Contents of Tender Document	
ITT 8.1	The Tenderer will submit any request for clarifications in writing to: - Manager, Supply Chain Geothermal Development Company Limited, Kawi House, South C, Bellevue Off Mombasa Road, Red Cross Road P.O. Box 100746 – 00101 NAIROBI, KENYA E-mail: procurement@gdc.co.ke; pkapto@gdc.co.ke And copy to: - General Manager, Geothermal Resource Development Geothermal Development Company Ltd, P.O Box 100746 – 00101, Nairobi-Kenya. E-mail: cofwona@gdc.co.ke: To reach GDC not later than Seven (7) days prior to closing date GDC will respond in writing (e-mail in PDF format) to any request received at least **Five (5) days** prior to the deadline for the submission of tender's. GDC shall publish its response for any enquiries/clarifications/questions/amendments relating to this tender at GDC website: www.gdc.co.ke & PPIP Portal www.tenders.go.ke and tenderers are advised to be checking this websites from time to time.
ITT 8.2	A Pre-Tender conference *"shall not"* take place at the following date, time and place: (B) A Mandatory site visit conducted by GDC *"shall"* take place at the following date, time and place: Date: 18th September 2024 Time: 9.30am Place: Menengai Geothermal Project NB: Bidders are required to assemble at GDC Polo Centre office, by 8.30am before proceeding to Menengai project site.
ITT 9.1	The Procuring Entity shall publish its responses at the website www.gdc.co.ke & www.tenders.go.ke

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
C. Preparation of Tenders	
ITT 13.1(h)	The Tenderer shall submit the following additional documents in its Tender: ***As per Evaluation Criteria stated below.***
ITT 15.1	Alternative Tenders ***"shall not be"*** considered.
ITT 15.2	Alternative times for completion ***"shall not be"*** permitted.
ITT 15.4	Alternative technical solutions ***shall not be permitted***
ITT 16.2	The currency of bid – Bidders must quote in Kenya Shillings or any freely convertible currency up to a maximum of two (2) currencies.
ITT 16.5	The prices quoted by the Tenderer shall be: ***fixed***
ITT 17.2.2	The rates of exchange shall be those published by Central Bank of Kenya as on the date of **closing date**
ITT 20.1	The Tender validity period shall be 150 days from the tender closing date.
ITT 21.1	*If a Tender Security shall be required, a Tender-Securing Declaration shall not be required,* A Tender Security *"shall be"* required. A Tender-Securing Declaration *"shall not be*" required. If a Tender Security shall be required, the amount and currency of the Tender Security shall be **KShs. 2,000,000.00 issued by a local bank or bank with a local correspondence valid for 180 days from the date of tender opening.**
ITT 22.3	The written confirmation of authorization to sign on behalf of the Tenderer shall consist of: **Power of Attorney**
D. Submission and Opening of Tenders	
ITT 24.1	For **Tender submission purposes** only, the Procuring Entity's address is: **Managing Director & CEO** **Geothermal Development Company Ltd – Kawi House, South C,** **Red Cross Road, off Popo Road** **P.O Box 100746-00101, NAIROBI** Electronic submissions are **NOT** allowed **The deadline for Tender submission is:** **3rd October 2024 at 1100HRS EAST AFRICAN TIME (E.A TIME) 11.00AM**
ITT 24.1	Tenderers ***not allowed*** to submit Tenders electronically.
ITT 27.1	The Tender opening shall take place at: Date of Tender opening shall be **3rd October 2024 at 11.00am and shall take place at the address below.** **Ground Floor** **Geothermal Development Company Ltd – Kawi House, South C,** **Red Cross Road, off Popo Road**

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
	P.O Box 100746-00101, NAIROBI
E. Evaluation, and Comparison of Tenders	
ITT 32.3	The Procuring Entity shall rectify quantifiable nonmaterial nonconformities related to the Tender Price in the following manner: **None**
ITT 34.4	The Contractor will prepare a complete Bills of Quantities for the work within 30 days after award of Contract.
ITT 35.1	The currency that shall be used for Tender evaluation and comparison purposes to convert at the selling exchange rate all Tender prices expressed in various currencies into a single currency is: Kenya Shillings The source of exchange rate shall be: **The Central bank of Kenya** The date for the exchange rate shall be*:* **the deadline date for Submission of the Tenders.**
ITT 36.2	A margin of preference *"shall not* "apply.
ITT 37.1	Contractor's may propose subcontracting: Maximum percentage of subcontracting permitted is: *__10_____% of the total contract amount.* Tenderers planning to subcontract more than 10% of total volume of work shall specify, in the Form of Tender, the activity (ies) or parts of the Works to be subcontracted along with complete details of the subcontractors and their qualification and experience.
ITT 37.1	*[Indicate N/A if not applicable]* The parts of the Works for which the Procuring Entity permits Tenderers to propose Specialized Subcontractors are designated as follows: _____ _____ _____ For the above-designated parts of the Works that may require Specialized Subcontractors, the relevant qualifications of the proposed Specialized Subcontractors will be added to the qualifications of the Tenderer for the purpose of evaluation.
ITT 37.2	The qualifications of the Specialized Subcontractors proposed by the Tenderer **may be added/may not be added** (*select one*) to the qualifications of the Tenderer.
ITT 38.4	A Proposal shall be rejected if it fails to achieve the minimum technical score of ____70_____ out of 100.
ITT 34.3	*[Indicate N/A if not applicable]* The parts of the Works for which the Procuring Entity permits Tenderers to propose Specialized Subcontractors are designated as follows: _____ _____ For the above-designated parts of the Works that may require Specialized Subcontractors, the relevant qualifications of the proposed Specialized Subcontractors will be added to the qualifications of the Tenderer for the purpose of evaluation.
ITT 39.2(d)	Additional requirements apply. These are detailed in the evaluation criteria in Section III, Evaluation and Qualification Criteria.
ITT 51.2	**Performance Security.**

Reference to ITC Clause	PARTICULARS OF APPENDIX TO INSTRUCTIONS TO TENDERS
	A performance security of 10% of the cost of the Additional connection works must be provided. The performance security/guarantee shall be issued by a bank operating in Kenya acceptable to GDC and should be valid for 30 days after completion of the contract period.
ITT 53.1	The procedures for making a Procurement-related Complaint are available from the PPRA Website www.ppra.go.ke or email complaints@ppra.go.ke. 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: **Managing Director & CEO** **Geothermal Development Company Ltd – Kawi House, South C,** **Red Cross Road, off Popo Road** **P.O Box 100746-00101, NAIROBI** Email address:*procurement@gdc.co.ke* In summary, a Procurement-related Complaint may challenge any of the following: (i) the terms of the Tender Documents; and (ii) the Procuring Entity's decision to award the contract.

SECTION III - EVALUATION AND QUALIFICATION CRITERIA

The following evaluation criteria shall be applied not withstanding any other requirement in the tender documents.

1. Mandatory Evaluation Requirements/Criteria
2. Technical Evaluation Requirements/Criteria
3. Financial Evaluation Requirements/Criteria

Stage One (1) – Mandatory Evaluation

Preliminary/Mandatory Evaluation Requirements/Criteria	
No.	**Requirement**
1.	Dully filled, Signed & Stamped **Form of Tender** in the format provided.
2.	Dully filled, Signed & Stamped Price Schedules.
3.	Provide an Original tender security in the amount of KShs 2,000,000.00 in the form of a local bank or insurance guarantee issued by a bank or insurance operating in Kenya and valid for at least thirty (30) days beyond the tender validity period.
4.	Certified copy of Certificate of Incorporation/ Registration in Kenya by an advocate or equivalent for foreign firms.
5.	Copy of Tax compliance certificate valid at the time of opening. The validity of the Tax certificate shall be confirmed from KRA Tax Checker or equivalent for foreign firms.
6.	Certified Copy of Certificate of Confirmation of Directors and Shareholding (CR12) for limited companies by an advocate or ID card for Sole Proprietorships or equivalent for foreign firms.
7.	Copy of Valid Business Permit or equivalent for foreign firms.
8.	Provide a **Power of Attorney** witnessed by an advocate indicating that the tender has been dully signed by the person lawfully authorized to do so. In the case of Bids submitted by an existing or intended Joint Venture Consortium Agreement/Association (JVCA), provide an undertaking signed by all parties; (i) stating that all parties shall be jointly and severally liable, and *(ii)* (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JVCA during the bidding process and, in the event the JVCA is awarded the Contract, during contract execution."
9.	Filled and Signed Certificate of Independent Tender Determination in the format provided – Section IV.
10.	Filled and Signed Self Declaration Form (FORM **SD1**) That The Person/Tenderer Is Not Debarred In The Matter Of The Public Procurement And Asset Disposal ACT 2015 in the format provided. *In the case of JV, all parties in the JVCA must individually meet this requirement* - Section IV.
11.	Filled and Signed Self Declaration Form (FORM **SD2**) That The Person/Tenderer Will Not Engage In Any Corrupt Or Fraudulent Practice in the format provided. *In case of a JV, all parties in the JVCA must individually meet this requirement* - Section IV.
12.	Filled and Signed Declaration and Commitment to The **Code of Ethics** in the format provided. *In case of a JV, all parties in the JVCA must individually meet this requirement*.
13.	Filled and Signed Tenderer Information Form in the format provided.
14.	Filled and Signed Tenderer's Eligibility - Confidential Business Questionnaire Form in the format provided. *In case of a JV, all parties in the JVCA must individually meet this requirement*.
15.	Filled and Signed and Stamped Tenderer's JV Members Information Form in

	the format provided. *This is applicable to parties in JV agreement only.* Provide details of Sub – Contractor/s, if any, duly completed
16.	Certificate of Tenderers Visit to Site
17.	Provide Audited Financial Statements for the last five years (2023-2018) also fill FORM FIN – 3.1
18.	No consistent history of court/arbitral award decisions against the Tenderer since 1st January *[2018] Form CON – 2*
19.	No Non-performance of a contract occurred as a result of contractor default since 1st January [2018]. Form CON – 2

NB: Not meeting the above requirements, the tenderer will be non-responsive and their bids will not be evaluated further. Please note that the authenticity of the above documents provided may be verified with the issuing/relevant authority and any forgery or false presentation in any one of the above shall lead to automatic disqualification and render the tenderers bid non-responsive. Note that you may be required to produce original Certificates for ease of verification.

GDC reserves the right to carryout independent investigations to verify the accuracy of information provided without notifying the tenderer.

Stage Two (2) Technical Proposal (Weight 70%) (As per Technical evaluation).

Technical Evaluation Criteria		
Item No.	**Description**	**Score**
1	Personnel (**FORM PER – 1, FORM PER-2)**	30
2	Bidders/ company experience (**FORM EXP - 4.1, FORM EXP -4.2 a & b)**	30
3	Key construction equipment (**FORM EQU)**	15
4	Methodology and program of works	10
5	Manufacturers Authorization and Brochures	15
Total		**100**
	Minimum Score required to pass on Technical Evaluation	**70%**

Stage 3: Financial Evaluation Criteria

1. Assessment for arithmetic error
2. ***The lowest evaluated bidder for all the complete schedules inclusive of taxes will be recommended for award.***

QUALIFICATION FORMS SUMMARY

1	2	3	*4*	*5*
Item No.	**Qualification Subject**	**Qualification Requirement**	***Document To be Completed by Tenderer***	***For Procuring Entity's Use (Qualification met or Not Met)***
1	Nationality	Nationality in accordance with ITT 3.6	Forms ELI – 1.1 and 1.2, with attachments	
2	Conflict of Interest	No conflicts of interest in accordance with ITT 3.2	Form of Tender	
3	PPRA Eligibility	Not having been declared ineligible by the PPRA as described in ITT 3.7	Form of Tender	
4	State- owned Enterprise	Meets conditions of ITT 3.8	Forms ELI – 1.1 and 1.2, with attachments	
5	Goods, equipment and services to be supplied under the contract	To have their origin in any country that is not determined ineligible under ITT 4.1	Forms ELI – 1.1 and 1.2, with attachments	
6	History of Non-Performing Contracts	Non-performance of a contract did not occur as a result of contractor default since 1st January [2018*]*.	Form CON-2	
7	Not debarred Based on Execution of Tender/Proposal Securing Declaration by the Procuring Entity	Not debarred based on-execution of a Tender/Proposal Securing Declaration pursuant to ITT 19.9	Form of Tender	
8	Pending Litigation	Tender's financial position and prospective long-term profitability still sound according to criteria established in 3.1 and assuming that all pending litigation will NOT be resolved against the Tenderer.	Form CON – 2	
9	Litigation History	No consistent history of court/arbitral award decisions against the Tenderer since 1st January *[2018]*	Form CON – 2	
10	Financial Capabilities	(i) The Tenderer shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as Kenya Shillings *[500,000,000]* equivalent for the subject contract(s) net of the Tenderer's other commitments.	Form FIN – 3.1, with attachments	

1	2	3	*4*	*5*
Item No.	**Qualification Subject**	**Qualification Requirement**	***Document To be Completed by Tenderer***	***For Procuring Entity's Use (Qualification met or Not Met)***
		(ii) The Tenderers shall also demonstrate, to the satisfaction of the Procuring Entity, that it has adequate sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments. (iii) The audited balance sheets or, if not required by the laws of the Tenderer's country, other financial statements acceptable to the Procuring Entity, for the last *[insert number of years]* years shall be submitted and must demonstrate the current soundness of the Tenderer's financial position and indicate its prospective long-term profitability.		
11	Average Annual Construction Turnover	Minimum average annual construction turnover of Kenya Shillings *[insert amount]*, equivalent calculated as total certified payments received for contracts in progress and/or completed within the last *[insert of year]* years, divided by *[insert number of years]* years	Form FIN – 3.2	
12	General Construction Experience	Experience under construction contracts in the role of prime contractor, JV member, sub-contractor, or management contractor for at least the last *[insert number of years]* years, starting 1st January *[insert year]*.	**4.** Form EXP – 4.1 **Experience**	
13	Specific Construction & Contract Management Experience	A minimum number of *[state the number]* similar contracts specified below that have been satisfactorily and substantially completed as a prime contractor, joint venture member, management contractor or sub-contractor between 1st January [*insert year*] and tender submission deadline i.e. …. (number) contracts, each of minimum value Kenya shillings…….. equivalent. [*In case the Works are to be tender as individual contracts under multiple contract procedure, the minimum number of contracts required for purposes of evaluating qualification shall be selected from the options mentioned in ITT 35.4]* The similarity of the contracts shall be based on the following: [*Based on Section VII, Scope of Works,*	Form EXP 4.2(a)	

1	2	3	*4*	*5*
Item No.	**Qualification Subject**	**Qualification Requirement**	***Document To be Completed by Tenderer***	***For Procuring Entity's Use (Qualification met or Not Met)***
		specify the minimum key requirements in terms of physical size, complexity, construction method, technology and/or other characteristics including part of the requirements that may be met by specialized subcontractors, if permitted in accordance with ITT 34.3]		

SECTION IV – TENDERING FORMS

QUALIFICATION FORMS

1. FOREIGN TENDERERS 40%RULE

Pursuant to ITT 3.10, a foreign tenderer must complete this form to demonstrate that the tender fulfils this condition.

ITEM	Description of Work Item	Describe location of Source	COST in K. shillings	Comments, if any
A	Local Labor			
1				
2				
3				
4				
5				
B	Sub contracts from Local sources			
1				
2				
3				
4				
5				
C	Local materials			
1				
2				
3				
4				
5				
D	Use of Local Plant and Equipment			
1				
2				
3				
4				
5				
E	Add any other items			
1				
2				
3				
4				
5				
6				
	TOTAL COST LOCAL CONTENT			
	PERCENTAGE OF CONTRACT PRICE			

2. 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 equipment		
Equipment information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment ☐ 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	

3. FORM PER - 1 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.

Contractor' Representative and Key Personnel

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

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

4. 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:	

	Language proficiency: *[language and levels of speaking, reading and writing skills]*	
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 Lowest 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): _____

5. 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.

FORM ELI-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.

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: _____
1. Attached are copies of original documents of ☐ 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. 2. Included are the organizational chart and a list of Board of Directors.

5.3 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 1st January *[insert year]* specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1. ☐ Contract(s) not performed since 1st 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]* Address of Procuring Entity: *[insert City/ street/building/floor number/room number/country]* Reason(s) for non-performance: *[indicate main reason(s)]*	*[insert amount]*
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 dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), Kenya Shilling 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 History in accordance with Section III, Evaluation and Qualification Criteria

☐ No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4.

☐ Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4 as indicated below.

Year of award	**Outcome as percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (currency), Kenya Shilling Equivalent (exchange rate)**
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Entity: *[insert full name]* Address of Procuring Entity: *[insert City/ street/building/floor number/room number/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)]*	*[insert amount]*

5.4 FORM FIN – 3.1:

Financial Situation and Performance

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

5.4.1. Financial Data

Type of Financial information in_____ (currency)	**Historic information for previous _____years, _____ (amount in currency, currency, exchange rate*, KES 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)					

Type of Financial information in_____ (currency)	**Historic information for previous _____*years*, _____ (amount in currency, currency, exchange rate*, KES equivalent)**				
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

*Refer to ITT 15 for the exchange rate

5.4.2 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		

5.4.3 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[1] for the _____years required above; and complying

[1]

with the requirements

5.5 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 Currency**	**Exchange rate**	**Kenya Shilling equivalent**
[indicate year]	*[insert amount and indicate currency]*		
Average Annual Construction Turnover *			

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

5.6 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 contract or contracts as specified in Section III, Evaluation and Qualification Criteria

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

5.7 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.

Current Contract Commitments					
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					

5.8 FORM EXP - 4.1

General Construction Experience

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

Page _____of _____pages

Starting Year	**Ending Year**	**Contract Identification**	**Role of Tenderer**
		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: _____	

5.9 FORM EXP -4.2(a)

Specific Construction and Contract 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:				

5.10 FORM EXP - 4.2 (a) (cont.)

Specific Construction and Contract Management Experience (cont.)

Similar Contract No.	**Information**
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	

5.11 FORM EXP - 4.2(b)

Construction Experience in Key Activities

Tenderer's Name: _____
Date: _____
Tenderer's JV Member Name: _____
Sub-contractor's Name[2] (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 Contractor ☐	Member in JV ☐	Management Contractor ☐	Sub-contractor ☐
Total Contract Amount			**Kenya Shilling**	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				
Procuring Entity's Name:				
Address: Telephone/fax number E-mail:				

[2] If applicable

	Information
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	

2. Activity No. Two
3. ……

OTHER FORMS

6. 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 (xxii) below.

Date of this Tender submission:.....*[insert date (as day, month and year) of Tender submission]* **Tender Name and Identification**:.....*[insert identification]* **Alternative No.**:.....*[insert identification No if this is a Tender for an alternative]*

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

Dear Sirs,

In accordance with the requirements of the project, we, the undersigned offer to design, procure and construct the steam field equipment …… at a cost of ……..……..within a period of ……..….months.

1. We undertake, I four tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Project Manager's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Particular Conditions of Contract.

2. We agree to adhere by this tender until_____*[Insert date]*, and it shall remain binding upon us and may be accepted at any time before that date.

3. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us. We further understand that you are not bound to accept the lowest or any tender you may receive.

4. We, the under signed, further declare that:

   (i) No reservations: We have examined and have no reservations to the tender document, including Addenda issued in accordance with ITT8;

   (ii) Eligibility: We meet the eligibility requirements and have no conflict of interest in accordance with ITT 3 and 4;

   (iii) Tender-Securing Declaration: We have not been debarred by the Authority based on execution of a Tender- Securing Declaration or Tender Securing Declaration in Kenya in accordance with ITT 19.8;

   iv) Conformity: We offer to execute in conformity with the tendering documents and in accordance with the implementation and completion specified in the construction schedule, the following

Works: *[insert a brief description of the Works];*

(v) Tender Price: The total price of our Tender, excluding any discounts offered in item1 above is: *[Insert one of the options below as appropriate]*

(vi Option 1, in case of one lot: Total price is: [*insert the total price of the Tender in words and figures, indicating the various amounts and the respective currencies*]; Or

Option 2, in case of multiple lots:

a) Total price of each lot [*insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies*]; and

b) Total price of all lots (sum of all lots) [*insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies*];

vii) Discounts: The discounts offered and the methodology for their application are:

viii) The discounts offered are: [*Specify in detail each discount offered.*]

ix) 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*];

x) Tender Validity Period: Our Tender shall be valid for the period specified in TDS 18.1 (as amended, if applicable) from the date fixed for the Tender submission deadline specified in TDS 22.1 (as amended, if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

xi) Performance Security: If our Tender is accepted, we commit to obtain a Performance Security in accordance with the Tender ding document;

xii) One Tender Per Tender: We are not submitting any other Tender (s) as an individual Tender, 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 3.4, other than alternative Tenders submitted in accordance with ITT 13.3;

xiii) Suspension and Debarment: We, along with any of our subcontractors, suppliers, Project Manager, 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 Public Procurement Regulatory Authority or any other entity of the Government of Kenya, or any international organization.

xiv) 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 requirementsofITT3.8];*

xv) Commissions, gratuities, fees: We have paid, or will pay the following commissions, gratuities, or fees with respect to the tender 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.")

xvi) Binding Contract: We understand that this Tender, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;

xvii) 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;

xviii) Fraud and Corruption: We here by 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;

xix) 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.

xx) **Code of Ethical Conduct:** We undertake to adhere by the Code of Ethical Conduct for Persons Participating in Public Procurement and Asset Disposal Activities in Kenya, copy available from ***www.pppra.go.ke*** during the procurement process and the execution of any resulting contract.

xxi) **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.

xxii) 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.

d) declaration and commitment to the code of ethics for Persons Participating in Public Procurement and Asset Disposal Activities in Kenya,

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]*

Title of the person signing the Tender: *[insert complete title of the person signing 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]*

Date signed_____day of_____,_____

Notes
** 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 to be attached with the Tender.*

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.	1. Country 2. City 3. Location 4. Building 5. Floor 6. Postal Address 7. Name and email of 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 (*postal and physical addresses, email, and telephone number*) of state which stock exchange	

General and Specific Details

b) Sole Proprietor, provide the following details.

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.

i) Are there any person/persons in …… …… (*Name of Procuring Entity)* who has/have an interest or relationship in this firm? Yes/No……

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 YES OR NO	If YES provide details of the relationship with Tenderer
1	Tenderer is directly or indirectly controls, is 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		

	Type of Conflict	Disclosure YES OR NO	If YES provide details of the relationship with Tenderer
	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 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)*

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 here by 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]

SELF-DECLARATION FORMS

FORM SD1

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 …….. in the Republic of ……. do hereby make a statement as follows: -

1. THAT I am the Company Secretary/ Chief Executive/ Managing Director/ Principal Officer/ Director of ……...…….. *(insert name of the Company)* who is a Bidder in respect of **Tender No.……** for……. *(insert tender title/ description)* for……. *(insert name of the Procuring entity)* and duly authorized and competent to make this statement.

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 here in 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.

I, ...of P. O. Box.....being a resident of..... in the Republic of..... do hereby make a statement as follows: -

1. THAT I am the Chief Executive/ Managing Director/ Principal Officer/ Director of.....
(insert name of the Company) who is a Bidder in respect of **Tender No.**.....for ……. *(insert tender title/description)* for …… *(insert name of the Procuring entity)*
and duly authorized and competent to make this statement.

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.

3. THAT the aforesaid Bidder, its servants and/or agents/subcontractors have not offered any inducement to any member of the Board, Management, Staff and/ or employees and/ or agents of……. *(name of 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 here in above is true to the best of my knowledge information and belief.

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

Bidder's Official Stamp

DECLARATION AND COMMITMENT TO THE CODE OF ETHICS

I…….....….....(person) on behalf of ***(Name 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 activities in Kenya 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…….....…
……

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

2.1 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 paragraphs1.1above.

2.2 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 in to 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 sub section (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 in to, 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 subcontractor 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.

2.3 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 2.3e. 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[1] 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[2] 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.

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

Beneficiary:_____

Request for Tenders No:

_____

Date:_____

TENDER GUARANTEE No.:_____

Guarantor: _____

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 contract 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 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) 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 on or before that date.

_____

[signature(s)]

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

FORMAT OF TENDER SECURITY [Option 2–Insurance Guarantee]

TENDER GUARANTEE No.: _____

1. Whereas …… [*Name of the tenderer]* (hereinafter called "the tenderer") has submitted its tender dated …… [*Date of submission of tender]* for the …… *[Name and/or description of the tender]* (hereinafter called "the Tender") for the execution of____under Request for Tenders No.___ _("the ITT").
2. KNOW ALL PEOPLE by these presents that WE …… of …… [**Name of Insurance Company**] having our registered office at …… (hereinafter called "the Guarantor"), are bound unto …….. [*Name of Procuring Entity*] (hereinafter called "the Procuring Entity") in the sum of …… (Currency and guarantee amount) for which payment well and truly to be made to the said Procuring Entity, the Guarantor binds itself, its successors and assigns, jointly and severally, firmly by these presents.

   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]*

Note: All italicized text is for use in preparing this form and shall be deleted from the final product.

TENDER-SECURING DECLARATION FORM {r 46 and 155(2)}

[The Bidder shall complete this Form in accordance with the instructions indicated]

Date: *[insert date (as day, month and year) of Tender Submission]* Tender No.: *[insert number of tendering process]* To: *[insert complete name of Purchaser]*

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Tender-Securing Declaration.

2. I/We accept that I/we will automatically be suspended from being eligible for tendering in any contract with the Purchaser for the period of time of [insert number of months or years] starting on [insert date], if we are in breach of our obligation (s) under the bid conditions, because we– (a) have withdrawn our tender during the period of tender validity specified by us in the Tendering Data Sheet; or (b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the instructions to tenders.

3. I/We understand that this Tender Securing Declaration shall expire if we are not the successful Tenderer (s), upon the earlier of:

   a) Our receipt of a copy of your notification of the name of the successful Tenderer; or

   b) Thirty days after the expiration of our Tender.

4. I/We understand that if I am/we are/in a Joint Venture, the Tender Securing Declaration must be in the name of the Joint Venture that submits the bid, and the Joint Venture has not been legally constituted at the time of bidding, the Tender Securing Declaration shall be in the name so fall future partners as named in the letter of intent.

Signed:……..……

….. Capacity / title (director or partner or sole proprietor, etc.)

…….……

Name:…….. Duly authorized to sign the bid for and on behalf of: *[insert complete name of Tenderer]* Dated on……. day of…….…… *[Insert date of signing]*

Seal or stamp

APPENDIX TO TENDER

Schedule of Currency requirements

Summary of currencies of the Tender for_____*[insert name of Section of the Works]*.

Name of currency	***Amounts payable***
Local currency: _____	
Foreign currency #1: _____	
Foreign currency #2: _____	
Foreign currency #3: _____	
Provisional sums expressed in local currency _____	[To be entered by the Procuring Entity]

PART II – PROCURING ENTITY'S REQUIREMENTS

SECTION VII - PROCURING ENTITY'S REQUIREMENTS

1. INTRODUCTION

The first 35 MWe net power plant by an Independent Power Provider (IPP) in Menengai is generating and supplying electric power to the National Grid with steam being supplied by GDC . The second 35 MWe net IPP has started construction and is expected to attain FCOD in September 2025 while the third 35 MWe net IPP is expected in early 2026.

To assure sustainable supply of steam to the three IPPs while maintaining acceptable reserve in the system, eight additional make-up wells have been identified to be connected to supply additional 300 t/hr of steam. Two reinjection wells will also be connected for reinjection of separated hot brine. The wells are as listed in the table below.

No	**Well ID**	**Location**	
		Eastings (m)	Northings (m)
1	MW-09B	172851	9977288
2	MW-10B	172549	9976615
3	MW-13B	172347	9977253
4	MW-17A	171270	9976722
5	MW-19B	172566	9977826
6	MW-36		
7	MW-37		
8	MW-38		
9	Reinjection well MW-07	170499	9977497
10	Reinjection well MW-22	172070	9978063

2. CONCEPT

It is proposed that the eight make-up wells be connected to the existing separators as shown in the table below.

No	**Well ID**	**Total 2-Phase flow (t/hr)**	**Separator Station**	**Design Capacity (t/hr)**	**Used Capacity (t/hr)**	**Available Capacity (t/hr)**
1	MW-09B	30	SS3	440	275	165
2	MW-19B	100				
3	MW-10B	42	SS6	216	50	166
4	MW-13B	120	SS2	148	80	68
5	MW-17A	83	SS1	623	500	123
6	MW-36	100**	SS4	300**	N/A	N/A

7	MW-37	100**	SS8	150**	N/A	N/A
8	MW-38	150**	SS9	200**	N/A	N/A

** - Approximate values. Shall be updated by the employer

3. TECHNICAL requirements

PART A: GENERAL TECHNICAL REQUIREMENTS

3.1 INTRODUCTION

3.1.1 General

GDC intends to connect ten (10) geothermal wells namely: Production wells MW-09B, MW-10B, MW-13B, MW-17A, MW-19B, MW-36, MW-37, and MW-38 and Reinjection wells MW-22 and MW-07 to the existing Menengai 105 MWe Steam Gathering System. This is to support sustainable generation of electric by the power plants and enhance sustainable steam production by enhanced reinjection of separated geothermal fluid..

The works will be executed as EPC contract and the contractor shall be expected to perform detailed design, procurement and construction of the steam field equipment as indicated under the employer requirements. It shall involve all Civil, Mechanical, Electrical, Instruments and control and any works necessary to have the system operated in a safe and efficient manner. The system shall be designed and installed to be compatible and shall be seamlessly integrated to the existing steam field system in Menengai.

The scope will include, but not limited, to:

- Two-phase piping and their respective fittings from wells MW-09B, MW-10B, MW-13B, MW-19B, MW-36, MW-37, MW-38.
- 1'' spouts for steam sampling and scale coupon taps.
- Flash tanks and weir boxes at wells MW-19B, MW-36, MW-37, MW-38 and reinjection wells MW-22 and MW-07.
- Separator stations at wells MW-36, MW-37 and MW-38 with instruments and controls
- Steam pipelines from separator stations MW-36, MW-37, MW-38 to the main steam lines
- Brine ponds with proper lining
- Associated Electrical, Instrumentation &Control works
- Separator station SS7 (MW-21A) brine evacuation line and associated equipment including insulation and cladding.
- Re-fitting of the existing two-phase pipeline from MW-17B onto MW-17A.
- All pressure protection equipment on two phase and steam lines
- All two phase, steam and brine metering equipment
- Steam lines to tie in points on the existing steam highway
- Brine reinjection lines to tie in points
- Condensate drain ports on steam lines
- All insulation and cladding for all the pipelines
- Access platforms and ladders for all equipment at height
- Fencing of well pads, separator stations and brine ponds
- All necessary civil works.
- Non-Destructive Tests (NDT) of all welded joints.
- Testing and commissioning
- Any repairs on the existing system that will be identified in time.

3.1.2 Connection of wells MW-09B and MW-19B

Two-Phase flow from production wells MW-09B and MW-19B will be connected to the existing separator vessel SS3 via an existing collector header pipe. Provision shall be made for isolation and working valves, rupture discs, well startup/ warming line, at each well, top valves for downhole logging, atmospheric flash tank and brine collection pond at MW-19B well pad and all associated electrical, instrumentation and control equipment which shall be integrated to existing SCADA system and be visible from GDC control room.

3.1.3 Connection of well MW-10B

Two-Phase flow from production well MW-10B will be connected to the existing separator vessel SS6 via a collector header pipe.
Provision shall be made for isolation and working valves, rupture discs, well startup/ warming line, top valve for downhole logging, all associated electrical, instrumentation and control equipment, which shall be integrated to existing SCADA system and be visible from GDC control room.

3.1.4 Connection of well MW-13B

Two-Phase flow from production well MW-13B will be connected to the existing separator vessel SS2 via a collector header pipe.
Provision shall be made for isolation and working valves, rupture discs, well startup/ warming line, top valve for downhole logging, all associated electrical, instrumentation and control equipment, which shall be integrated to existing SCADA system and be visible from GDC control room.

3.1.5 Connection of well MW-17A

Existing two-phase pipeline from well MW-17B will be shifted to MW-17A together with all control and instrumentation equipment. Only pipe supports shall be redone and any other tasks deemed necessary for safe operation of the equipment.

3.1.6 Enhancement of SS7 separator brine lines

The separator brine lines including valves, insulation and cladding are to be replaced/enhanced to increase capacity to evacuate separated brine. The contractor will provide design for approval by the employer. All associated electrical, instrumentation and controls shall include parts of the works. Instrumentation and control equipment shall be integrated to existing SCADA system and be visible from GDC control room.

3.1.7 Connection of wells MW-36, MW-37 and MW-38

The three production wells MW-36, MW-37 and MW-38 will be connected to new individual separator vessels SS4, SS8 and SS9 respectively. The two-phase pipelines from these production wells will be directed to the separators via a collector header pipe. Isolation and working valves will be installed along two-phase, brine and steam pipelines. Rupture discs will be installed as a way of protecting the system against over-pressure. Well startup/ warming line shall be installed at each well. Provision for downhole logging to be provided. Flash tank, brine ponds, weir boxes shall be provided for well startup. Hot brine from SS9 shall be connected to the existing brine line. Appropriate isolation valves shall be installed along the pipeline. All associated electrical, instrumentation and controls shall form parts of the works. The control system shall be Integrated to the existing GDC SCADA system. The contractor shall ensure the instrumentation and control installed is compatible with the current GDC system. The system shall be tested by the contractor to ensure reliability and compatibility.

3.1.8 Connection of reinjection wells MW-22 and MW-07

Brine pipeline to MW-07 shall be connected to an existing T-Junction. Isolation valves shall be installed with appropriate instrumentation and controls at the MW-07 well pad. Fluid metering equipment shall be installed. All associated electrical, instrumentation and controls shall form parts of the works. The control system shall be Integrated to the existing GDC SCADA system. The contractor shall ensure the instrumentation and control installed is compatible with the current GDC system. The system shall be tested by the contractor to ensure reliability and compatibility. Flash tank, brine ponds, weir boxes shall be provided for well emergency well diversion. Appropriate well pad lighting shall be installed. The well pad shall be fenced and lockable gate provided

Brine pipeline to MW-22 shall be utilised for hot brine from SS4 and SS8 separator stations. Isolation valves shall be installed with appropriate instrumentation and controls at the MW-22 well pad. Fluid metering equipment shall be installed at the well pad. All associated electrical, instrumentation and controls shall form parts of the works. The control system shall be Integrated to the existing GDC SCADA system. The contractor shall ensure the instrumentation and control installed is compatible with the current GDC system. The system shall be tested by the contractor to ensure reliability and compatibility. Flash tank, brine ponds, weir boxes shall be provided for well emergency well diversion. Appropriate well pad lighting shall be installed. The well pad shall be fenced and lockable gate provided.

3.1.9 Equipment Locations & Pipe Routes

All practical steps shall be taken to eliminate low points in the 2 phase and brine reinjection lines. If low points cannot be avoided, then provision shall be made for the collection and proper disposal of drained brine or condensate.

Pipes shall not block roads or access ways. Road crossings shall be below the road through a culvert. Vertical loops shall not be used unless there are clear advantages to the Employer or an underpass is impractical. Vertical loops shall be subject to the approval of the Employer.

3.2.0 Preparation of design drawings

This is an EPC contract, and the full construction drawings will be made and provided by the contractor. The Contractor shall implement the design works and the designs shall be approved by the employer. Details of equipment to be installed such as instrumentation, valves, actuators, pipelines, separators, flash tanks and other items shall be provided by the manufacturer from who the contractor will procure. The Contractor shall provide all equipment deemed necessary for the safe operation of the Steam field.

4.0 GENERAL SCOPE OF WORKS

Contractor's Scope of Work shall include all mechanical, electrical, instrumentation and civil works as well as any ancillary works/services required to complete the whole project.

Consequently the Work consists of furnishing/providing all plant designs, labour and materials, construction of plant, temporary works, equipment, auxiliaries and accessories as well as all associated works, special equipment, tools and tackles, spare parts, consumables and providing any equipment/work and services required for design, fabrication, furnishing, testing in manufacturer's workshop, packing for export, shipping, loading and unloading, transport from docks to stores, delivery to Site, preservation at Site, installing/erecting, constructing, interfacing, finishing, painting, Testing on Completion, putting into operation and handing over of the complete plant all in strict compliance with the requirements of the Contract.

The Contract also includes all obligations for the Warranty Period of the complete Works.

The Work shall be performed in accordance with the Contract, Employer's Requirements, Specification, Schedules and approved drawings by the employer.

The Work further consists of furnishing all documents and any information required including operation and maintenance manuals in order to enable the Employer to operate and maintain the plant reliably and safely.

General drawings and design calculations shall be done by the contractor complete with parts lists and exploded view drawings of all equipment and "As Built" drawings of all plant and equipment installed civil, architectural and structural work. The employer shall approve all drawings submitted by the contractor.

Generally the tender documents describe the complete project so to give a good understanding to Bidders and the Contractor.

All work not expressly called for in the Employer's Requirements, but necessary for making the Works complete in every respect including proper operation of all the equipment supplied shall be provided by the Contractor at no additional cost to the Employer. Work not mentioned or described in the Specification and work described in the Specification and not shown on the drawings will nevertheless be considered to be included in this Contract. All plant, equipment, materials and work shall be provided to complete the installation ready for commercial operation whether or not specifically called for herein.

At no time during the Contract, the Contractor shall consider or imply that any work, other than that explicitly stated in the Contract, but required for the execution of the Works is to be carried out by Employer's departments or to be paid for extra by the Employer.

5.0 CONSTRUCTION REQUIREMENTS

5.1 General

All materials and equipment furnished shall be:

- New and undamaged when installed or otherwise incorporated in the Works
- Properly identified by appropriate stampings and markings
- Accompanied with original manufacturer's documentation where appropriate
- Industrial type suited for their intended function, specifically geothermal service
- Resistant to the type of corrosion generally encountered in geothermal facilities
- Successfully used in a similar geothermal application within the past 10 years and have demonstrated satisfactory service

All plant items and corresponding parts performing similar duties shall be interchangeable in order to minimize the stocking of spare parts. Contractor shall also provide interchangeability as well as standardized equipment within packages.

No departure from the specification shall be made subsequent to the Contract without the written approval of the Employer.

In the event of there being any direct conflict in the technical requirements specified in the various parts of these specifications, the most stringent requirement shall apply.

5.2 Material Substitution

Substitution of a specified material will only be accepted if the proposed material is satisfactorily demonstrated to be equal in all respects or superior to the original on which the design was based. Recycling and/or reconstitution of solders is not permitted without written approval from the Employer.

5.3 Material Quality Control

The Contractor is responsible for the quality of the machinery and parts, which are supplied under the Contract including those, supplied by their subcontractors.

All material forms including but not confined to forgings, castings, welding and wrought products shall be free from flaws and defects to the standards necessary to comply with the requirements of the appropriate design code or specification, with the requirements of this specification and with the functional requirements of their intended use.

Repairs to materials and/or components are not permitted without full agreement by the Employer/Engineer and all planned operations, which may affect the condition and/or properties of the material such as welding, brazing, manipulation process and heat treatments, are subject to Employer's approval.

5.4 Common Equipment and Services

The Engineering services refer to the complete specified plant.

The Contractor shall actively participate in drawing-up of all required licensing applications.
Furthermore, all other required advanced services to meet the agreed project time schedule of Contract shall be executed.

The following supplies and services are to be included in the corresponding section prices.

5.4.1 General

- Material and personnel costs for tests and inspections which are mandated in legislation,
- Material costs for site inspections,
- All as-built documents (on data carriers; data formats as requested by the Employer),
- Quality control plan and safety plan,
- Complete documentation as set out in the Tender Specification,
- Operating manual in summary form,
- Detailed operating and maintenance instructions,
- A maintenance program for all equipment of the Plant,
- Housekeeping during construction,
- Staff facilities during construction,
- Fire protection during construction

5.4.2 Mechanical

- All necessary pipelines, vessels, valves, instruments, and actuators,
- All required line warm-up systems,
- All connection and adaptation works for tie-in into general supply systems,
- All necessary vents and drains
- All connection elements, screws, bolts, nuts, including gaskets and seals as necessary,
- All temporary installations required
- All temporary pipework as required during connection measures,
- Check of required existing structures, plant components and systems and their rehabilitation where they lie within the scope of supply, or definition of required measures in good time if they lie outside of the scope of supply,
- All necessary support structures, hangers etc.,
- All necessary base frames, mounting plates, grouted in parts, rag bolts, covers, etc.,
- All required steel parts embedded in concrete,
- All couplings and coupling guards for electric motors and other drives,
- All necessary lifting equipment and hoists
- Required safety equipment, pressure relief valves, etc.,
- All thermal and noise insulation including cladding as well as any other noise attenuation measures,
- Stairways, ladders, platforms, galleries and walkways to all plant components, including escape routes as necessary,
- All necessary steel structures, stairs, ladders on platforms, weather protection,
- All necessary corrosion protection measures for plant components and equipment stored or mounted on site up to the time of reliability test run,
- Complete primer and top coatings conforming to colour code, clarified with Employer,
- Necessary noise abatements measures,
- Complete labelling of all plant components according to Employers system and in plain language,
- All fire protection measures,
- All necessary lubrication systems,
- Provision of all connections and temporary pipework for steam purging of the steam line,
- Flushing of all other lines including disposal of the effluents; protection with wood and/or plastic of all instrumentation and appendages to be installed during construction,

- All standard accessories and auxiliary equipment which normally form part of the scope of supplies,
- All necessary tests, inspections and works acceptances as well as all certificates and reports of these,
- Valve trims for purging and subsequent exchange,
- Removal of any unused material,
- Scaffolding for all work above ground level, and
- Insurances as necessary.

5.4.3 Electrical, Instrumentation and Control

All local measurements and field control loops (thermocouples, pressure gauges, local regulating devices, etc.) as well as all instruments for reliability test and checks,

- All necessary electrical drives, complete installation material, that is wiring, cabling and piping material, all needed fastenings, conduits, brackets and other supports, including the cable trays, required junction boxes and cubicles, and all field control boxes.
- All instruments mounted on instrumentation racks,
- All cables and cable supporting,
- Outdoor lighting,
- Lightning protection,
- The design and installation of underground electrical cables must meet the IEEE standards.
- Electrical earthing of the equipment,
- Clarification of all logic interconnections: sequence, interlocking, protection, safeguarding for coordinated operation/start-up/shut down of individual items of equipment.

5.4.4 Civil

- All necessary surveying works, investigation and studies
- Preparation of site, demolition works, removal of underground obstacles,
- Earthworks, drainage, excavation and refilling works,
- Temporary concrete and reinforced concrete works, masonry and earthing,
- Temporary water proofing works for pressing and non-pressing water,
- Storm water drainages
- Security fencing
- Access roads for construction works
- Transport of all dumping material to dump locations,
- Interpretation of soil bearing test
- Temporary fencing of construction site
- Temporary protection of works
- Temporary supports
- Making good the disturbed areas.

5.4.5 Packaging and Transportation

- Suitable packaging and transportation of the entire scope of supplies
- Free construction site, on-site transportation and temporary storage including inspections and, if necessary, ensuring the prerequisites for transportation,
- Transport insurance,
- Disposal of packing and transportation material,
- Customs clearance,
- Crane or hoisting facilities at seaport and site,
- Transportation to site and unloading at site.

5.4.6 Erection, Commissioning and Testing

Complete erection of the scope of supply up to operational readiness; this includes mobilization and provision of the required supervisory staff, skilled and unskilled personnel, as well as of installation scaffolding, cranes, hoists, equipment and materials, personnel accommodation, prescribed tests and inspections,

- Commissioning and optimization of all plant components as well as conducting all necessary measurements,

- Supervision of erection, commissioning and Reliability Test Run of complete supplied equipment, and
- All testing as specified.

5.4.8 Further Obligations of the Contractor

5.4.8.1 General

The Contractor shall be solely responsible for all mechanical, electrical, Instrumentation & Control (I&C) as well as civil works in regard of the equipment and systems provided by him for the plant in the frame of his Contract Package.

The Contractor's obligations shall further consist of, but shall not be limited to, the items listed below. All other materials, services, etc. as required shall be provided whether or not these are enumerated below in order to provide a full operational plant and to fulfil the requirements stated in any part of this Specification.

a) The Contractor shall provide staff, test, operate and maintain the Works, i.e. Steam field, being provided under the Contract, at various loads including the maximum continuous rating in part and as a whole in order to demonstrate that the plant can be operated in a safe, reliable and efficient manner up to and including the date of Taking Over.

b) Thereafter the Contractor be responsible for maintaining sufficient qualified and experienced staff at site to deal with any matter for which the Contractor is responsible during the Warranty Period after the unit Take Over Date. During the Warranty Period all defects arising in the plant shall be notified to the Contractor through "Notification of Defect" (NOD)/work request documents. The Contractor is responsible for the immediate and speedy rectification of defects covered under the NODs. The Contractor shall also rectify promptly the Take Over Defects informed to him when the Provisional Acceptance Certificate (PAC) is issued. The Warranty Period for the defects rectified shall recommence from the date of acceptance by the Employer/Engineer of such rectification. All specialist engineers, supervisors, etc. required during annual maintenance and or overhauls during the Warranty Period shall be provided within the Contract.

c) The Contractor shall submit all necessary drawings and documents to the relevant local authorities and shall obtain their approval, before submitting the documents to the Employer/Engineer. It is the obligation of the Contractor to find out the approvals required and to submit all necessary information and to get approvals from all competent local authorities.

d) The Contractor shall follow the Employer's Safety Procedures, HSE Policy and strictly adhere to it. The method statement of any work shall include risk assessment.

e) The Contractor shall report all accidents and near misses (near hits) and the follow-up actions in the prescribed format. The monthly accident/incident report which shall be submitted by the Contractor shall include Accident Frequency Rates (AFR), Accident Severity Rate (ASR).

f) The Contractor shall co-operate fully with Employer/Engineers Safety Section in providing information and at the site inspection.

g) The Personal Protection Equipment (PPE's) used by the Contractor's personnel shall comply with the International Codes and Standards or approved standard by the concerned authority.

h) The Contractor's safety policy covering all the above points in addition to the Contractor's own safety rules shall be submitted for review and approval eight (8) weeks prior to the start of the site work.

i) Providing warehouses, receiving of equipment, marine and local transport, unloading of delivered equipment, keeping the equipment under custody at site until the Plant or part thereof will be handed over to the Employer.

j) Performance of all specified and all necessary inspections and tests.

k) Handling of all insurance claims in relation with Contractor's works.

l) Participation in co-ordination and progress meetings and in Site meetings.

m) Preparation and submission of work and time schedules showing the critical path, like overall project schedule and detailed project/work schedules together with the monthly progress reports.

n) Preparation and submission of monthly progress reports including site photos.

o) Providing Warranty and Service Engineers and services during the Warranty Period.

p) Preparation and performing Employer's staff site/overseas training.

q) Providing spare parts, special equipment, tools and tackles as well as consumables.

r) Providing O&M Manuals and final As-Built drawings.

5.4.8.2 Waste Handling and Disposal

The Contractor shall strictly manage the construction waste in accordance with the Sustainable Waste Management Act, 2022, Environmental Management and Coordination (Waste Management) Regulations 2006, EMC (Water Quality) Regulations 2006 and Nakuru County Public Health and Sanitation Act, 2017. These shall include:

a) identification and segregation of waste at the source

b) provision of adequate and suitable properly labelled and colour coded waste containers/bins

c) transfer and storage of recyclable and reusable waste (scrap metals and salvaged wood/timber) at the designated temporary holding areas within Menengai as directed by GDC's Engineer/appointed SHE Officer

d) transportation of the various waste including the hazardous material/waste at predetermined frequencies using NEMA licensed waste transporters

e) final disposal of the various waste including the hazardous material/waste at NEMA licensed and/or county approved sites and availing dully filled waste tracking sheets to GDC's appointed Engineer/appointed SHE Officer

f) Use of environmentally friendly solidifiers for cementations slurries prior to offsite disposal by a NEMA licensed handler

5.5 Bidder to inform himself fully

The Bidder shall inform himself fully and shall be deemed to have carefully examined the Tender Documents, the site and the existing installations as applicable and to have satisfied himself as to the nature and character of the work to be executed, the prevailing meteorological conditions as well as the relevant local rules and regulations and as well as any other relevant matters and details.

A site visit prior to submitting the bid is mandatory.

Any information received from the Employer/Engineer shall not in any way relieve the Contractor from his responsibility for supplying the equipment and material and executing his work in terms of the Contract including all details as well as incidental work and provision of all accessories or apparatus which may not be specifically mentioned in the contract but are necessary for ensuring to complete the installation and to operate in a safe and reliable manner under all operation conditions of the plant.

Thus, the contractor shall be held responsible for any delay arising out of non- compliance with these requirements. He shall also be held responsible for any delay in case he has not informed the Employer /Engineer about any discrepancy in time.

5.6 Contract planning Requirements and Reporting

5.6.1 General

The Contractor shall produce three types of planning schedules.

1. A **"start-up" Schedule** as an interim plan covering those activities due to take place in the first three months of the Contract.

2. A **Contract Schedule** which shall cover the whole of the Contract period in summary form and include all major activities.

3. A **Project Control Schedule** (Working Program) which embodies all the major activities in the Contract Schedule with the addition of all other activities in a computer based Critical Path Network.

5.6.2 Project Start up Schedule

Within 10 working days of Contract Award, the Contractor shall provide a Project Start Up schedule.

The start-up schedule shall be of bar chart format, covering all activities scheduled for the first 3 months from Contract Award.

The start-up schedule shall be used for progress reporting during the interim period whilst the Contract Schedule is being produced and shall be updated regularly to indicate progress achieved.

The start-up schedule shall be submitted as part of the Contractor's monthly progress report until replaced by the Contract Schedule.

5.6.3 Contract Schedule

Within 30 working days of Contract Award the Contractor shall revise and re-issue to the Employer/Engineer for review the tender submission overall summary schedule. After satisfactory review, this schedule shall become the Contract Schedule.

All subsequent networks and schedules produced by the Contractor shall directly relate to the time scales of the Contract Schedule.

The Contract Schedule may be presented in bar chart format with interdependencies clearly shown and all milestones and Contract interfaces identified. It shall show only major activities as required by the Employer/Engineer to provide a level 2 program.

The Contract Schedule shall be marked up by the Contractor monthly to indicate the progress achieved against each activity, and submitted as part of the Contractor's monthly progress report. All reports on the Contract Schedule shall show the original planned activities, duration and dates without change as well as any agreed modifications.

5.6.4 Project Control Schedule (Working program)

5.6.4.1 General requirements

Within 60 working days of Contract Award the Contractor shall produce and issue for review a Project Control Schedule using the Critical Path Network (CPN) method. It shall run on a computer using proprietary software such as Primavera or similar.

The Contractor shall produce reports from the schedule and reports deemed necessary by the Employer/Engineer to show the status of project, delayed and critical activities, etc. Three (3) copies of these reports shall be submitted to the Employer. The Contractor shall maintain the Project Control Schedule to reflect the current state of Contract progress and shall issue the required reports and data with each monthly progress report.

The Contract Schedule shall indicate for each item of the Works the various phases of the work from the commencement of the Contract to its final completion, e.g. ordering of materials, manufacture, delivery, erection, construction, commissioning and testing.

The Contractor shall inform himself and make allowance in his schedule for National Holidays.

If at any time during the execution of the Contract it is found necessary to modify the approved schedules, the Contractor shall inform the Employer/Engineer and submit the modified schedules for his approval. Any approval of changes to the approved schedules shall not constitute approval of an extension to the guaranteed completion date.

The report on material procurement shall give the date and details of order placed and indicate the delivery quoted by the manufacturer, and in respect of the agreed Contract Schedule. If any delivery has an adverse effect on the Contract Schedule the Contractor shall state the remedial action taken to ensure that delays do not occur.

The shipping of each order or part order shall be monitored on the progress report giving the date by which the equipment will be available for shipping, the estimated time of arrival on site and the actually achieved dates.

The sites erection portion of the progress report shall be segregated into the main and ancillary items of civil, mechanical, electrical and control and instrumentation work and each item of work shall be monitored giving the percentage completion and the projected completion date of the work in accordance with the agreed Contract Schedule.

Any delay which will affect the completion, testing and commissioning dates of any item of the plant shall be detailed by the Contractor who shall state the action he is taking to effect completion to the Contract Schedule. The Contractor shall report in respect of the various sections of the works the erection equipment in use or held in readiness, a return of labour and supervisory staff, and details of any matters arising which may generally affect the progress of site work.

The Contractor shall give a summary of the detailed progress report giving the position with regard to the agreed Contract Schedule.

The progress reports shall be set out in a format to the approval of the Employer/Engineer, and forwarded promptly so

that on receipt the information contained therein is not more than one month prior to the end of the month to which the report relates. Copies of the progress report shall be distributed as shown below:

- 3 copies progress report - Employer

If during the execution of the Contract the Employer/Engineer considers the progress position of any section of the work to be unsatisfactory or for any other reason relating to the Contract, he will be at liberty to convene a special meeting and the Contractor's Representatives shall attend such meetings. In addition, regular monthly project meetings will be held throughout the project design and construction period and the Contractor's representatives shall attend.

The Contractor's Site Office shall prepare and submit copies of the weekly progress report to the Employer. This report shall summarize site activities and record any details where difficulties in maintaining the agreed program are being experienced or are likely to cause subsequent delay.

The Contractor shall be responsible for expediting the delivery of all material and equipment to be provided by him and his sub-Contractors.

Access to the Contractor's and Sub-Contractor's Works shall be granted to the Employer/Engineer or their Representative at any reasonable time for the purpose of ascertaining progress.

5.6.4.2 Particular Requirements

Upon award of the Contract, the Contractor shall maintain at the project site, hardware, software and qualified staff to prepare and manage the detailed project schedule (Working program) updates and logic changes as maybe required during the contract duration using relevant software

The working program shall be used to plan, organize and execute the procurement, manufacturing, construction and commissioning work, record and report actual performance and progress and show how the Contractor plans to complete the project as of the end of each progress reporting period (weekly and monthly).

The Contractor shall enclose in his offer soft and colour coded hard copy of detailed project working program (Revision 0) for Employer's approval, covering accurate procurement, and manufacturing and civil construction activities. The approved working program shall form the baseline of the project. In doing so, the Contractor shall incorporate sub vendors and civil sub-contractor's schedules as evidence for Engineer and Employer's verification. This revision shall also include a tentative construction and commissioning schedule.

The Contractor shall submit within 14 days following the award of the Contract color-coded soft and hard copy of the updated detailed project- working program (Revision 1) for Engineer and Employer's approval including accurate construction and commissioning activities. The approved working program shall form the baseline of the project.

The Contractor shall submit on weekly basis as part of the weekly progress report the updated soft and color-coded hard copy working programs, revisions 0 or 1 as applicable. The soft copies shall mainly enable the Employer to examine the Working Breakdown Structure (WBS), duration, relations/logics, activity weighting, percentages, etc. involved. The Contractor need not to disclose confidential cost details.

Layouts of the detailed working program shall cover as minimum, the physical and structural breakdown of the project, contract millstones, completion dates, type of work to be performed and labour trades involved. The Organization Breakdown Structure (OBS) shall also cover key personnel of Contractor and subcontractors. The Contractor shall weekly perform mathematical computer analysis of the detailed working program and the tabulation for each activity, of the hardcopy, shall include as a minimum the following:

1. Activity Identification Number
2. Activity description
3. Activity code(s)
4. Schedule and actual/remaining duration for each activity
5. Earliest start date (by calendar date)
6. Earliest finish date (by calendar date)
7. Actual start date (by calendar date)
8. Actual finish date (by calendar date)
9. Latest start date (by calendar date)
10. Latest finish date (by calendar date)
11. Early start variance
12. Early finish variance
13. Float in calendar days
14. Percentage of activity completed

Contractor shall provide through the weekly and monthly reports color-coded the PRIMAVERA or equivalent software Project progress performance report S-Curves. S- Curves shall cover Project overall, procurement, manufacturing, erection and commissioning activities. Each activity shall be sub-divided into Civil, Mechanical, Electrical and I&C disciplines S-Curves. Overall S-curves of major deliverables shall also be submitted on a monthly basis. Each S-curve shall cover

procurement, erection and commissioning activities.
Contractor shall report the following weighting percentages when reporting progress of the procurement and manufacturing:

1. 10% for issue of request for quotation (RFQ)
2. 20% for issue of sub-vendor/sub-contractor application for approval.
3. 50% upon approval of sub-vendor/sub-contractor by Employer/Engineer
4. 80% for successful Factory Acceptance Test (FAT)
5. 100% for delivery to site.

5.6.5 Photographs

As soon as work commences on site the Contractor shall provide color photographs of the Works from suitable positions to be selected by the Contractor. Up to 30 photographs per month shall be provided in bound photographic albums.
Each photographic print shall not be less than photos 240×180 mm and bear a printed description, a serial number and the date when taken. Specific photographs shall be enlarged and mounted for wall hanging.
All photographs in digital format shall be held at the Contractor's site office, numbered and handed over to the Employer at the completion of the Contract.
The Contractor shall provide a number of selected photographs for submission with each copy of the monthly progress report as required by the Employer. The Contractor shall also provide from time to time as and when required by the Employer, further photographs of the Works to record or illustrate specific events.
All other albums and photographs shall be distributed to the Employer/Engineer's site office which shall require each month 3 sets of photographs in separately bound albums on dates to be agreed with the Employer/Engineer.
The Contractor shall also supply three copies of an edited video showing the main construction features throughout the construction and commissioning phase of the project.

6.6.6 Project Progress Report & Photographs

The Contractor shall prepare and submit during the whole project period to the Employer until the 5th day of each calendar month the "Project Progress Report".
The Project Progress reports shall be submitted in hard and soft copies and shall include but not limited to the followings:

1. Table of Content
2. Abbreviations
3. Executive Summary
4. 'S' Curves
   - (Engineering: Project Overall, Civil, Mechanical, Electrical, I&C).
   - (Procurement/Manufacturing: Project Overall).
   - (Construction/Erection: Project Overall, Civil, Mechanical, Electrical, I&C).
   - (Testing/Commissioning of Works
5. Site Photographs
6. Occupational Health & Safety
7. Engineering Status
8. Procurement and Manufacturing Status
9. Factory Test & Inspection & One Month look ahead.
10. Shipment Status
11. Site Activities
12. Quality Assurance
13. Areas of Concern and Measures to Overcome Any Obstacle
14. Invoices and Payment
15. Drawings List
16. Correspondence
17. Project Organization
18. Project Time Schedule
19. List of pending items
20. Vendor approval list.

Colour photographs showing the progress of Works and completion of each structure or major feature (after the first month of construction and continuing every month until completion) shall be included. A full size 35 mm digital camera shall be

used and minimum 9cm by 13cm prints shall be furnished with explanations of the subject photograph.
The project progress report shall report about the activities of the previous month, shall document sufficiently the status of the project at the end of each calendar month and give an outlook for the following three months. Any critical events or milestone shall be reported about. Photographs shall also be used to document the progress on Site. The updated detailed progress schedule reduced to A3 or A4 size shall be part of the project

5.7 Meetings and Conferences

The Contractor shall attend all pre-programmed and ad-hoc meetings and conferences with their Project Manager/Site Manager, as well as senior engineers and responsible staff at their own expenses.

5.7.1 Kick-Off Meeting

Not later than thirty (30) days after the Commencement of the Contract the Employer will require a kick off meeting with the Contractor in the Employer's office to start off the project and discuss the project schedule, project manual, basic requirements and procedures, scheduling of drawings, equipment manufacture and installation, other similar items that are essential for the completion of the project.

5.7.2 Site meetings

As long as activities on Site are going on, periodical, weekly Site progress meetings with all parties participating shall be held. These meetings shall be held mainly for the following purposes:

- To review the progress of the Works, discuss measures to be taken to overcome possible delays, establish short and long term programs and to co-ordinate Employer's interface requirements with the Contractor's activities.
- To discuss any construction, installation and commissioning problems and deal with any matter relating to smooth execution of the Works.

The meetings shall be convened by the Employer, who will prepare Minutes of the Meetings and distribute them to all parties concerned.
Beside the periodical meetings the Employer will call for daily briefings to monitor the daily erection & commissioning activities.

In case of necessity, ad hoc meetings shall also be arranged on Site.

5.8 Computer Software

The version and model of the Computer Software to be supplied under this Contract shall be the latest model/version available at the time of shipment and not what is quoted in the Tender documents, at the time of the Proposal.
The version and model availability, commercially, will be judged/based on the manufacturers press notification. If the installation/implementation of the Software as the case may be, is not completed successfully within the stipulated time schedule or six months whichever is earlier and if a higher model/version of the Hardware and/or software becomes available in the market during this period, then the Employer has the right/option to order the Contractor to supply/upgrade to the latest available model/version of the Hardware and/or software.

5.9 Contract Documents

The preparation and compilation of the Contract Documents shall be performed by the Contractor under the direction of the Employer/Engineer. The cost of reproducing the Contract Documents shall be deemed to be included in the Contract price.
The Contractor shall provide to the Employer within 8 (eight) weeks of the date for acceptance of his Proposal 5(five) bound copies of the Contract Documents in the English language based on the original prepared in conjunction with the Employer/Engineer. Additional 5(five bound copies shall be delivered in A5 size.
Each copy shall be accompanied with an electronic copy containing the Contract Documents in *.pdf (Acrobat) format with overall index and Tables of Contents consisting of links to the referenced content.

6.0 REFERENCE SITE DATA

6.1 Site Data

The following information is based on information investigated by the Employer. The Contractor is not relieved from his obligation to carry out all investigations necessary to inform him fully. The information given below shall only be taken as guidance for detailed investigations and studies to be performed by the Contractor.

6.1.1 Site Location

The Project is located in the Menengai Geothermal Field on the outskirts of Nakuru Town, about 180 Km west of Nairobi. Nakuru is the fourth largest town in Kenya with a population of about 600,000 and has well developed social amenities such as educational institutions, medical facilities, hotels, banking and shopping facilities. The main economic activities include agriculture, manufacturing, tourism and construction.

6.1.2 Access and transport to the site

The site is accessible by main roads (A104) from Nairobi via Nakuru town. Most of the area is well served by a network of earth and all weather roads. The Nairobi –Kisumu Railway line and Trans-Africa highway passes through the southern part of the area. Electricity and telephone service lines serve most of the habitation and the surrounding farm land. Heavy plant materials and equipment can be unloaded at the Jomo Kenyatta International Airport, Nairobi or the port of Mombasa (some 600km away) and transported to the site by truck.

6.2 Meteorological conditions

Climate	Dry sub-humid equatorial
Dry bulb temperature (min)	10 C
Dry bulb temperature (max)	30 C
RH (Average Min)	45%
RH (Average Max)	96.3%
Prevailing wind velocity & direction	2.58m/s ……..South to North
Basic wind speed and height	2.58m/s at 10m height
Ambient pressure	0.8 bar absolute
Long rainy season (April to August) Max recorded in 24Hrs	YR 2023- 578.8 mm 41.4 mm
Short rainy season (September, October, November, December) Max recorded in 24Hrs	YR 2023- 423.8 mm 56.4mm

6.3 Geographical data

Average height above mean sea level	2050 m
Terrain Type	Rough Volcanic Lava
Overhead Power lines	33 kV
Special Feature	12 km diameter, up to 400 m deep Menengai Caldera wall

7.0 HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION REQUIREMENTS

7.1 General

The Bidder/Contractor shall construct the Plant to meet all applicable environmental regulations, environmental standards and stipulations of the Republic of Kenya and the environmental, health and Safety Guidelines for geothermal power plants. The Contractor shall demonstrate during the construction phase and during the performance tests that the Plant complies with all applicable environmental regulations and standards.

The Contractor is requested to take all environmental protection requirements included in the ESIA study into account

as well as all corresponding environmental & social mitigation measures addressed to reduce environmental & social impacts to a low as reasonable possible level. This is specifically applicable for the neighboring protected areas.
Any deviation from the approved environmental & social mitigation measures can only be done with prior written approval to be obtained from the competent environmental authority.
For avoidance of doubt, among others, the most stringent requirements from the following sources shall apply as minimum:

- This employer's requirements
- Kenya's Environmental Management and Co-Coordination Act (EMC 1999)
- Kenya's EMC (Impact Assessment and Audit - Amendment) Regulations (2009)
- Kenya's EMC (Air Quality) Regulations (2014)
- Kenya's EMC (Water Quality) Regulations (2006)
- Kenya's EMC (Waste Management) Regulations (2006)
- Kenya's EMC (Noise and Excessive Vibration Pollution - Control) Regulations (2009)
- Kenya's Occupational Safety and Health Act (2007)
- GDC Occupation Health & Safety Policy Statement

7.2 Noise

The project shall guarantee and prove during the performance tests compliance with the following noise pressure levels (compensating for background emissions)

Location	Unit	Design limit (max)
at the wellpad and cluster fences when all equipment is in operation	dB(A)	60
at 1 meter distance of open air installations, equipment or buildings	dB(A)	85
inside buildings	dB(A)	90

Remark:

The noise pressure levels shall be measured according to ISO standards and shall be achieved for the Works compensating for background noise.
Upon request and subject to Kenya's National Environmental Management Authority approval the Contractor may exceed the guaranteed noise pressure levels for a limited time.
Exemptions from the guaranteed noise pressure levels are granted for emergency conditions including the following:

- Rupture disc operation
- Equipment failures, and
- Alarm sirens/warning devices (e.g. fire, H2S)

7.3 Emissions to Air

The emissions to air shall be regularly monitored according to the requirements of the environmental authorities. The installation of hydrogen sulphide monitoring and warning systems shall be considered. The number and location of monitors should be determined based on an assessment of construction locations prone to hydrogen sulphide emission (e.g. wellpads and separator station).

7.4 Definition of Occupational Health & Safety

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995. The definition reads:
"Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job."
"The main focus in occupational health is on three different objectives:

1. The maintenance and promotion of workers' health and working capacity;
2. The improvement of working environment and work to become conducive to safety and health and
3. Development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."
Workers safety has to be understood as the practice of an employer using preventative measures to prevent hazards to the employees' personal safety. This practice includes creating plans and procedures for employees and managers in the workplace. In addition, workplace safety involves creating policies and keeping emergency materials available for employee and manager use while at a work site.

7.5 Applicable Health & Safety Requirements

If not otherwise specified, the following legal health & safety requirements and guidelines should be taken into account while construction of the project:

- The Occupational Safety & Health Act, 2007, together with the following guidelines and statements implemented by GDC:
- GDC Occupational Health & Safety Policy Statement
- GDC Occupational Safety and Health System Manual

Beside the consideration of the above mentioned legal requirements and company guidelines, the Contractor will be requested to develop and prepare various health & safety deliverables before start of the construction activities. These deliverables should be subject of review and comment by GDC and/or the Consultant.
The aim of the deliverables is to evaluate if the Contractor has the correct understanding for the implementation of the health & safety requirements and to assess if all needed health & safety measures are addressed.
The Contractor will be requested to develop and prepare and follow the deliverables.

7.6 Health & Safety Plan

The Contractor shall establish an effective project specific H&S Plan. The H&S Plan shall be submitted by the Contractor not later than 4 weeks prior to any commencement of works at site.
Any work at site, including mobilization to the site will not be allowed to commence until unconditional approval of the document.
The H&S Plan shall describe how health and safety will be managed at site, including mobilization and transport to the site, and how the specified H&S standards will be applied in practice. In addition the Contractor shall ensure adequate communication of these requirements throughout the supply chain, its supervision, and the workers themselves.

The H&S Plan should detail the management arrangements for carrying out the work including but not limited to:

- Overview of the project;
- Clearly identified risks associated with the scope of works;
- Site management and organization;
- Management of sub-contractors;
- Communication, Cooperation and Co-ordination;
- Site security;
- Traffic management;
- Welfare facilities and provision;
- Arrangements for supervision of workers at site;
- Arrangements for information, instruction and training including induction; • Management of hazards on site;
- Arrangements for identification of hazards, assessment of risk and production of Method Statements;
- Arrangements for hazardous undertakings e.g. confined space, work at height, hot work, excavations etc.
- Permit to work system;
- Site rules;
- Arrangements for managing plant and equipment;
- Management or lifting operations (if needed);

- Management of temporary works;
- Arrangements for monitoring and auditing etc.
- Requirements as defined by relevant statutory planning authorities e.g. traffic, noise, working hours etc.
- Incident & accident investigation.
- The H&S Plan should consider as well site rules outlining the H&S Requirements for all workers. The site rules shall include but are not limited to:
    - Site access;
    - Access to and transport on the site;
    - Entering and leaving the site;
    - Use of mobile phones;
    - Smoking;
    - Personal Protective Equipment (PPE) requirements;
    - General behavior
    - Transport to the site;
    - Vehicle traffic within the site area;
    - Access to the site and Working Areas;
    - Restricted areas.

A checklist for the review and approval of project specific Health & Safety Plan will be developed by the Consultant prior to submission of the H&S Plan. The checklist will define the minimum requirements to be met by the Contractor.

7.7 Contractor's Health & Safety Method Statements

The Contractor is requested to develop workplace specific H&S Method Statements. The required content of H&S Method Statements is described below.
Health & Safety Method Statements are part of the project framework for effective H&S management. The H&S Policy states the intention to provide a safe and healthy workplace.
Specific health & safety workplace method statements shall address particular issues or hazards and the measures how to control workplace those identified hazards. The procedures should be used together with other hazard control measures to eliminate or reduce the risks of accidents and incidents and of workplace illness and/or injuries.
H&S Method Statements shall be developed for the following activities expected to be needed during construction:

- Site access control and site security procedure;
- Use of hazardous chemicals;
- Simultaneous activities;
- Shift work, shift rotation and fatigue;
- Risk assessment;
- Job Safety Analysis;
- Working in confined spaces;
- Use of personal protective equipment;
- Excavation works;
- Hot works;
- Welding;
- Emergency response procedure;
- Evacuation procedure (if applicable);
- First aid;
- Use of electrical equipment;

A checklist for the review and approval of project specific Health & Safety Procedures will be developed by the Consultant prior to the first construction activities. The checklist will define the minimum requirements to be met by the Contractor.

7.8 Health & Safety Forms

The Contractor is requested to develop forms, such as checklists, risk assessment form sheet, to support the use of method statements, instructions, audits etc.
These forms must be attached to the respective documents, if applicable, and must be read in closed conjunction with the corresponding document(s).

The checklist shall be subject of an update and revision in case improvements or needed changes were found suitable and required.
The checklist must be subject of project documentation, in the same way and considering the same procedure that is applicable for the project documentation in general.
Examples of Health & Safety Forms are provided below:

- Contractor Audit Questionnaire
- Basic Risk Assessment
- Permit to Work
- Workplace Inspection Checklist
- Accident/Incident Report/Investigation
- Fire Risk Assessment
- Hazardous Substance Risk Assessment

Additional forms might be necessary and should be prepared by the Contractor, e.g. inspection checklists, workplace inspection checklists.

8.0 GENERAL COMMUNICATION PROCEDURE

8.1 Correspondence

The distribution of the correspondence shall follow the rules as stated in the Project Procedure Manual provided after contract award.

8.2 Submission of Documents and Approval Procedure

8.2.1 Specification Stage

Any drawings issued by the Employer together with the Specifications and forming part of the documents for tendering purposes are intended to be descriptive of the character of the works and used in conjunction with the requirements of the specification and shall in no way limit the responsibility of the Contractor to supply all equipment, materials and services necessary to provide a complete and functional system. Any omission from both drawings and the Specification or express reference to any detail or work necessary and obviously intended shall not relieve the Contractor of his responsibility to include such detail or work in his supply.
When measurements are affected by conditions already established, the Contractor shall take and be responsible for field measurements notwithstanding any information set forth on the Specification drawings.
The Specification portray the basic layout of the scope of works and the Contractor shall incorporate these requirements into his Proposal.
With regard to the interconnections to and the extensions of existing installations supplied, the drawings and descriptions included in this Specification shall be assumed to be descriptive to the extent necessary for tendering purposes.
After award of contract, the drawings and data of the external installations necessary for determining precisely the locations and design conditions of interconnecting the various systems will be made available through the by the Employer.
The Bidder is at liberty to comment on any document and drawing issued with the Specification within the period of tendering if not stated otherwise in the Instructions to Bidders for the Technical Proposal. After the Proposal has been submitted the Bidder is deemed to have checked all these documents and drawings and they are without any restriction accepted by him. No claim resulting from omissions from or discrepancies in the tender documents will be accepted by the Employer.

8.2.2 Details of Offer & Departure from the Specification

Notwithstanding any description, drawings, or illustrations which may be submitted with the Proposal, it will be deemed that the Contractor complies with the requirements of the Specification.

8.2.3 Documents to be submitted during Construction

After contract signing, Contractor shall submit the detail document transmittal schedule for approval of Employer. Items marked with (A) shall be for approval and (I) for information.

Document	Purpose	Weeks after Commencement	
		Preliminary	Final
• **General**			
• Works program	A	1	2

• Progress reports	I		every 1 month
• Erection and installation progress reports	I		every 1 month
• List of Subcontractors/manufacturers	A	2	4
• Proposed inspection and testing programs	A	2	every 2 months
• Detailed program for commissioning	I	8 weeks prior to Tests on Completion	4 weeks prior to start of Tests on Completion
• Testing documents/report of results of all tests	I		2 weeks before each test but latest 12 weeks before start of trial operation
• Training program	A		16
• Health and safety Management system	A	2	4
• Quality Assurance program	A	2	4
• Preliminary (draft) Operation and maintenance manual with description of all equipment and facilities	I		2 months ahead of start of commissioning
• Final Operation and maintenance manual with description of all equipment and facilities	I		2 months in advance of the Taking Over of the plant
• Detailed operation and maintenance instructions	I		2 months ahead of start of commissioning
• As-built documentation including drawings of all equipment	review/ comment		2 months prior to the plant Taking Over

8.2.4

Statutory Regulations

The works and all equipment and materials forming part of this Contract shall comply in all respects with any relevant statutory regulations, by-laws or orders currently in force where the Works are to be erected.

8.3 Documents, Goods, Materials, etc. to be handed over to the Employer

In addition to the requirements of the corresponding clauses of the conditions of Contract on provisional taking over, the Employer receives and issues hand over certificate for construction documents, consumables, chemicals, lubricants, spare parts, as built drawings, O&M manuals, special tools and handling equipment, vehicles, laptops etc., required by this Specification to be handed over to the Employer other than the permanent works erected on site.

The receipt shall state clearly that all items have been received in a satisfactory condition as required under the Contract.

The Contractor shall be responsible for demonstrating the satisfactory condition of all items delivered to the Employer including the repacking for storage on site.

The contractor shall handover all remaining unused materials including scrap materials to the employer. Employer shall provide storage location for these materials. Contractor shall prepare a list of all materials together with their description handed over to the Employer. The transport cost of the materials to the storage site shall be borne by the Contractor.

8.4 Sub-contractors & Sub-orders

As soon as practicable after entering into the contract the Contractor shall, having obtained the Employer's consent in accordance with the Conditions of Contract, enter into the subcontracts he considers necessary for the satisfactory completion of the Contract works.

Sub-orders shall include all relevant sections of the Tender Specification, all relevant approved design particulars furnished by the Contractor for the equipment in question, delivery schedule to meet the project control program, all relevant approved drawings, etc. An unpriced copy of such order shall be provided by the Contractor to the Employer. All sub-orders shall be prepared in English. [2]

It is the responsibility of the Contractor that all information requested shall be submitted in sufficient time to allow adequate time for examination and approval. The Contractor shall take note that subcontractors of main equipment have to be approved by the Employer and no claim shall be allowed if orders have been given by the Contractor without prior approval.

9.0 SITE PROCEDURES

9.1 General Field Construction Regulations

9.1.1 Site Regulations

The Contractor and his employees shall be subject to such rules and regulations for the conduct of the work at the site as the Employer may establish. The Contractor shall be responsible for the enforcement among his employees of the Employer's instructions regarding signs, advertisements, the prevention of fires and accidents, and other general regulations.

The Contractor shall be responsible for the co-ordination of his work with the Employer's staff and with that of other contractors at site, if this will be the case, to prevent delay in the work being performed by others or in the general completion of the project. In this case, wherever required by the Employer, the Contractor shall make adjustments in his construction sequence and schedules to avoid imposing delays on the other contractors. The Contractor shall conduct his work at all times so as to prevent any unnecessary hindrance or interference with other contractors and with the operation of the existing plant.

In case the operation of an existing plant will be affected by the Contractor's intended work, the Contractor shall give adequate notice to the Employer and shall obtain clearance from them before proceeding with such work. Should any interference occur, the Employer will establish precedence and will decide which work shall be relocated regardless of which work was first done or which equipment was first installed. The relocation shall be carried out by the Contractor at own costs.

9.1.2 Records

The Contractor shall, at all times during the progress of the work, keep at his field office such particulars and data relative to the work done and equipment installed as will permit the Employer's inspection of such records and information as may be required.

9.1.3 Permit to Work System

No work shall be carried out by any person on plant which is electrically charged from the Employer's system, or is operational or which has been taken over, or on the connections of plant to other plant which is so charged and/or operational, or which has been taken over, unless permission has been granted by the issue of a Permit to Work (PTW). If the Contractor is in doubt as to whether authorization is required for any particular area of work, he should consult the Employer/Engineer or his nominated representative for assistance.

The Contractor shall be responsible, with the assistance of the Employer/Engineer as required, for requesting the issue of a relevant Permit to Work outlining the work he proposes to do and giving the name of the competent person to which the Permit to Work should be issued. The Contractor shall ensure that the plant and equipment covered by the Permit to Work meets his requirements and that the period of cover is also adequate.

The Permit to Work shall be submitted in a prescribed format to the Employer/Employer. The Permit to Work shall contain detailed method statement outlining the activities with outages of any system, if required.

In order to simplify the process and to ensure timely approval of PTWs without compromising the safety the following management of the PTW System shall be taken into consideration:

1. The Contractor submits the PTW through the Employer/Engineer to the relevant department for approval or comments. PTWs will be cleared within one (1) week from the time of receipt.
2. After signing of the PTWs by the Employer/Engineer the Contractor shall do the distribution to concerned Employer's departments.
3. PTWs will be discussed in a meeting 5 (five) days following the receipt of PTWs by the concerned Employer's departments at user department's office attended by the Employer/Engineer/ Contractor/concerned Employer's users departments to discuss the method statement, relevant drawings, personnel involved in the works. During the meeting, Employer/Engineer shall either approve the PTWs or agree on specific/necessary additional requirements, which if fulfilled by the Contractor will result in approval of the PTWs.
4. If additional requirements are raised as per item 3 above, the Contractor shall fulfil the requirements and re-submit the revised PTW to Employer/Engineer. The Employer/Engineer will ensure that all requirements are addressed/fulfilled by Contractor and only then forward the PTWs to the concerned Employer's department through the Contractor for approval within 48 hours.
5. The Contractor is responsible to plan and to ensure that only **once in each month** PTWs are released for approval.

9.1.4 Signboards
The Contractor shall provide, erect and maintain at the entrance to the site an approved painted signboard minimum size 2 m x 1 m, lettered in English giving Employer's, Engineer's and the Contractor's name and the name of the project as approved by the Employer/Engineer.

9.1.5 Installation of Equipment
None of the works which require approval by the local authorities shall be installed before approval has been obtained by the Contractor from the appropriate authorities. The obtaining of such approvals is part of the Contractor's contractual commitments.

9.1.6 Special Conditions
9.1.6.1 Inspection of Site
If required, inspection of work on site shall be arranged.

9.1.6.2 Contractor's Superintendence
The Contractor shall provide adequate number of supervisors to ensure proper and timely completion of work. He shall also nominate one responsible person who shall liaison with the Employer on all matters, pertaining to the contract and who will be available at site all through the working hours.

9.1.6.3 Supply of Plant, Materials & Labour
The Contractor shall arrange to provide, install and remove the necessary scaffoldings, staging, safety nets, dollies and platforms as required by his workmen. All tools and consumable shall be supplied by the contractor, except where specifically excluded.
10.1.6.4 Workmanship
The workmanship shall be of the highest standards. Wherever applicable National/International standards will be used.
9.1.6.5 Safety Precautions
The work under this contract shall be carried out with adequate care to prevent spillage and dirtying of plant area, the equipment and floors, where such pillage occur must be immediately cleaned. Any violation to this care will be treated as a serious offence. The job is to be carried out in the operational areas. The Contractor's men shall not touch or operate any of the equipment, switches, controls or instruments.
The Contractor shall comply with the fire-fighting regulation. Smoking is not allowed within the Site apart from designated smoking areas. Wherever scaffoldings are necessary, the same shall be of self-supporting design of robust materials and securely fixed to supports. Any accident or injury to personnel will be entirely to Contractor's responsibility.
As the Steamfield is operational, the Contractor shall inform the Employer's representative every day before commencement and after completion of day's work. The Contractor shall take any such precautionary measures that may be advised by the Employer.
The followings shall be considered and strictly adhered to:

1. Contractors shall strictly adhere to the Employer's Safety Rules, a copy of which be collected prior to the beginning of his work on site.
2. Contractors to submit a copy of their Safety Policy, prior to starting the work.
3. Contractors shall produce method statements outlining how they will approach work activities. The method statements shall include risk assessments.
4. Contractors shall monitor and provide details of accident and near hit performance during the course of the contract.
5. Contractors shall ensure that visitors to the site are properly made aware of Safety & Emergency procedures during a check-in procedure.
6. Contractors shall report on their Health & Safety Performance as part of their project progress reporting.
7. Contractors shall report to Safety Section of the Employer through the concerned Dept. all accidents and near misses (Near Hits) as per procedure and prescribed form. In continuation of which they shall also fill up the Follow up Report form including mentioning their actions.
8. Contractors shall report quarterly to Safety Section of the Employer through the concerned department, as per procedure, their Accident Frequency Rates (APR), Accident Severity Rates (ASR), other parameters in connection with Safety and Occupational Health.
9. Contractors shall report quarterly to Safety Section of the Employer through the concerned department as per procedure, Risk Assessment Report with their part of action.
10. Contractors shall provide the all-necessary information and co-operation to the Safety Section of the Employer and the Employer's staff in inspection, investigation and in other safety and occupational health issues.

11. Contractors shall co-operate with Safety Section of the Employer during cross checking which the Employer reserves the right for.
12. Contractors shall take the specification through the concerned department before procuring and after that quality standard clearance of Safety Section of Employer.
13. Contractors shall take care and take necessary action of all other additional items if found hazardous and risky in nature.
14. Apart from those mentioned above, contractors shall adhere to follow the latest advice and suggestions on Health & Safety issues, during the contract.
15. Contractors shall strictly comply with the Local and Federal Order/Safety Rules.
16. The basic/minimum educational qualification of the Contractor's "Full time Safety Officer" should be "degree/Diploma in Civil Engineering or branch of Engineering works undertaken".

9.1.6.6 Security Precautions

The Contractor shall comply with the Employer's rules regarding security measures and for this purpose he will submit the names and other details as required to enable the Employer to issue gate passes for the personnel engaged for the job. The list of vehicles, which would be used for transportation of men and materials, shall be provided to the Employer with their registration numbers. The presence of contractor's men shall be restricted to the area of their work.

9.1.6.7 Clean up

The Contractor shall promptly clean up and remove any waste and spills on ground and other parts and leave those items in original shape and condition. All waste disposal shall be in accordance with ISO-14001, and the local NEMA regulations and practices. If any part of the plant is defaced or smeared these shall be cleaned and restored to original condition free of cost by the Contractor. At all times during execution of this contract, the area of work shall be kept neat, clean and tidy. On completion of the job, the place of work shall be cleaned to the satisfaction of the Employer.

9.1.6.8 Reporting Damages

In spite of all the care taken by the Contractor and his workmen if any of the plant items are damaged or defaced or otherwise made in-operational by the Contractor's men, this shall be forthwith reported to Employer/Engineer to avert further damages, breakdown or shutdown of the total plant.

9.1.6.9 Hot Work Permit

In hazardous areas, no machinery, tools and plant used therein shall be moved in without specific clearance from the Employer. The work in the area shall follow absolute safe methods as recognized in international practice for work in hazardous area. No hot work shall be carried out without specific "Hot Work Permit". The requirements for the system have to be agreed upon by the Employer/Engineer. During the period of this contract, the Contractor's shall ensure that adequate fire protection to equipment and men are available to fight any possible hazardous.

9.1.7 Safety & Security Guidelines for the Contractor

The following safety and security guidelines shall strictly be observed by the Contractor and his sub-contractors who work on the site for the execution of their contracts -where applicable-:

1. Personnel, material, vehicle etc., are subject to security check, when passing through the GDC gate
2. The Contractor's personnel will be admitted to the Site on request, on the basis of the Identity Cards issued by the Contractor. This card shall be withdrawn when the services of the contractor's personnel are terminated. Alternatively, the Employer may issue its gate passes.
3. The Contractor's supervisory/managerial staff who may require access to the operating area or Administration office, Stores, etc., will be provided with Employer security passes for which the Contractor shall apply in prescribed form.
4. Vehicles for transporting personnel will not be allowed to ply on Site. However, personal cars/Engineer's transports may be allowed on Site, after the security check, up the Contractor's site office. This shall be parked only in the designated parking area. However, this will be on a case-by-case basis.
5. The following information shall be provided by the Contractor's:
    a. A list of staff giving names, Identity card/Passport number and nationality.
    b. List of vehicles required to be allowed entry onto Site
    c. Specimen signature of person authorized to sign gate pass, Identity, Cards etc.
6. The Contractor shall bring with him a comprehensive list of materials, tools, and tackles, etc., which he is likely to take back on completion of the job. This list shall be handed over to security for necessary verification.
7. Material transporting vehicles are allowed on site up to the Contractor's work site. Parking of such vehicle shall strictly be restricted to parking area provided.
8. 'Permit to Work' shall be obtained from the Engineer before starting any work.

9. Strict compliance to the 'No smoking' Warning shall be ensured.
10. Burning of waste material on site is strictly prohibited.
11. The Contractor's shall keep their work site and lay by areas neat and free from hazard.
12. Normally visitors will not be allowed on Site. However, if any visitor is to be taken to a Contractor's office on Site for a particular purpose, the Security personnel at the main gate house shall be contacted who may make necessary arrangements for the same.
13. Visitors are strictly prohibited from the operating areas.
14. Photography is prohibited on Site. However, if for any specific purpose taking photo is necessary, prior permission shall be obtained for the same.
15. The Contractor shall comply with all the government rules and regulations applicable to their works.
16. The Contractor and his sub-contractors shall comply with the British Safety Council/ISO 18000 requirements.

9.1.8 Site Services during Construction & Site Installations

9.1.8.1 Introduction

The Contractor shall include for the following site services in accordance with the appropriate specification included elsewhere in this document.

All buildings and equipment provided in accordance with this requirement shall be made available within 8 weeks following the commencement of the works at the site and must not be removed without the prior approval of the Employer/Engineer.

Following completion of the required period of availability and agreement by the Employer/Engineer, all buildings and equipment, unless specified to the contrary, must be removed from the site to the Employer/Engineers approval and the site returned to its original state both above and below ground and all resulting debris removed to an approved dump to the Employer/Engineers complete satisfaction.

9.1.8.2 Contractor's Site Buildings

The Employer will provide the Contractor with a limited uncovered area for the storage of plant, equipment and materials during the execution of the Contract.

The Contractor shall be responsible for the off-loading, transporting and handling of all the plant and equipment and materials needed for the purpose of the Contract.

The handling and storage of all plant at the site shall be to the risk of the Contractor and without responsibility of the Employer.

The Contractor shall protect all material against corrosion, mechanical damage or deterioration during storage and erection on site. The protection shall be to the approval of the Employer/Engineer.

The Bidder shall provide with his Proposal details of his proposals in compliance with the foregoing requirements in respect of stores, laydown areas and other such facilities.

Within the designated area the Contractor shall provide and maintain an office appropriate to the efficient management and control of the project.

Furnishings and office equipment shall be provided by the Contractor as he might consider most appropriate to his efficient completion of the project.

The Contractor shall use proper transport facilities to transport his employees to and from the site to their living quarters. Tractors, cranes, trucks and other such construction vehicles shall not be used to transport personnel.

9.1.8.3 Site Installations

The Bidder shall look for sufficient lay down areas, storage space and facilities, labour camps, parking places, etc. off site. The affected cross transports, inclusive un-loading and uploading, lifts and intermediate storage, shall be included within the Proposal, no extra charge for those transports will be accepted by the Employer. The Contractor shall be responsible for obtaining all No Objection Certificates (NOC) of various authorities. The Contractor shall not be relieved from his obligation to arrange for suitable lay down area and include all respective cost in its Proposal.

For coordination reasons Bidder's site installation plan**,** shall include all relevant information of the site installation for the complete plant and for all related works and not only for civil works.

9.1.8.4 Site First Aid Post

The Contractor is to provide a site first aid station. The station shall be made available for the use of all personnel who shall be employed on the site for overall project works. The first aid facility shall be suitable for the provision of a first aid service to the number of people expected on this Site.

The Contractor shall collect a copy of the Employer's Safety Rules and strictly adhere to it. The method statement of any work shall include Risk Assessment. The Contractor shall report all accidents and near misses (near hits) and the

follow up actions in the prescribed format. The quarterly report, which shall be submitted by the Contractor, shall include Accident Frequency Rate (AFR), Accident Severity Rate (ASR). The Contractor shall co-operate fully with the Employer's Safety Sections in providing information and at the site inspection. The personal protection equipment for safety (PPES) used by the Contractor personnel shall comply with the International Standards or approved Standards by the concerned Authorities.

The Contractor safety policy covering all the above points in addition to their own shall be submitted for review and approval 8 weeks prior to the start of the site work.

9.1.8.5 Site Fire Protection

Site fire protection services shall be provided to meet with the following specific project requirements:

a) Temporary fire assembly points. The Contract shall include for the provision of clear marker posts at locations around all the various project work sites as defined by the Employer/Engineer.

b) Portable fire extinguishers. The Contract shall include for the provision of 4x10 kg portable dry powder fire extinguishers at each temporary fire assembly point.

The Contractor shall ensure that each extinguisher is tested and maintained in accordance with accepted fire safety requirements and details of the routine tests and completed maintenance works shall be recorded in an approved register.

c) Fire safety instructions. Fire safety instruction in English shall be prepared and displayed at each temporary fire assembly point.

The Site shall be a 'NO SMOKING ZONE' The Contractor and his subcontractors shall be deemed to have made themselves fully aware of this requirement and its implementation by all concerned.

9.1.8.6 Temporary Latrines & Ablutions

Temporary toilets and ablutions shall be provided by the contractor for the use of the Contractor and his sub-contractors. The Contractor shall also include in his Contract for the treatment or disposal of the sewage resulting from his own temporary toilet and ablution facilities.

9.1.8.7 Temporary Electricity & Water Supplies

The Contractor shall include the supply of the total electricity and water demand for the Contract works. The temporary electricity and water supplies shall be provided by the Contractor. The Contractor shall provide all equipment required to provide the electricity and water supplies to the site. This includes all water required for hydro testing equipment. The employer will provide a designated water dispensing point within the project area. The contractor will apply for the temporary power to Kenya Power. The contractor shall pay for the water if provided for by the employer at existing NAWASCO rates.

9.1.8.8 Radios/Walkie-Talkies

The Contractor shall be responsible for obtaining all necessary permits from the relevant authorities for the use of any radio equipment on the site.

9.1.9 Operations at Site

9.1.9.1 Protection

During erection and commissioning, the Contractor shall provide all temporary scaffolding, ladders, platforms with handrails and cover plates for channels, opening, etc. for proper and safe access of workmen and inspectors and has to provide adequate protection against material falling from higher level on personnel and equipment below. In case of damage of equipment, structures, platforms, etc. by other contractors, the Contractor has first to estimate the damage and to clarify with the other contractor(s) concerned the right for compensation. The Employer will assist if deemed necessary.

9.1.9.2 Cleanliness

The Contractor shall keep reasonably clean the site on which he erects or stores equipment and remove all waste material resulting from the work as it accumulates.

9.1.9.3 Material Transport from Site Storage Area to the Erection Spot

The Contractor is obliged to transport only such material to the erection spot, which will be used for installation within the following couple of days. It is not allowed to use the erection areas to store materials.

Whenever possible, the material and equipment shall be transported to the erection spot unpacked.

9.1.10 Erection & Checking at Site

All work at the site shall be carried out in such a manner as not to obstruct the operations of other contractors on the site or interfere with the operation of the Employer's existing installations on the site, and the Contractor shall co-operate with other contractors and the Employer/Engineer to attain this end.

The Contractor shall take all necessary precautions and provide all necessary equipment to protect the existing plant from damage and/or interruption to its commercial operation during the construction period of the Works. Any damage caused to existing plant or installation by the Contractor or Subcontractor's plant, machinery, personnel or vehicles shall be made good by the Contractor at his cost.
The carrying out of all the work included in the Contract shall be supervised by a sufficient number of qualified representatives of the Contractor, and full facilities and assistance shall be afforded for the Employer/Engineer to check the works. The Contractor shall obtain from the Employer/Engineer details of the parts which he proposes to inspect, but such inspection shall in no way exonerate the Contractor from any of his obligations. The Contractor, if requested by the Employer/Engineer, shall open for inspection before erection any equipment, which has been delivered to the site partly assembled.
The Contractor shall keep clean the site on which he erects or stores plant, removing all waste material resulting from the works as it accumulates and as reasonably directed. On completion of the works the site shall be left clean and tidy to the satisfaction of the Employer/Engineer. Any damage done to buildings, structures, plant or property belonging to the Employer shall be made good at the Contractor's expense.
The Contractor shall ensure the correctness of electrical and mechanical connections to all equipment supplied under the Contract before such equipment is commissioned.
During erection and commissioning the Contractor shall provide all temporary scaffolding, ladders, platforms with toe boards and hand-rails essential for proper access of workmen and inspectors, cover or rail off dangerous openings or holes in floors, and afford adequate protection against materials falling from a higher level on to personnel below.
The maximum personal safety must be afforded to personnel either directly engaged on this Contract or who in the normal course of their occupations find it necessary to utilize temporary works erected by the Contractor or to frequent the working area.
The Contractor must take particular precaution to ensure adequate protection of all site personnel during any period when radiographic or X- ray inspection of welding joints is being carried out. Warning notices must be fully displayed and the inspection areas fenced off so that no personnel will at any time be subject to any radiation dosages in excess of the permissible levels quoted for unclassified non-radiation personnel in published statutory limits.
In each and every case involving a connection between the Plant supplied under this Contract and any other existing plant which may or may not be in service the Contractor must make suitable arrangements as regards the time and manner in which the connection is made subject only to the approval of the Engineer and the Employer's Representative who is in charge of the existing plant. Where cases arise involving the operation of the plant or work on plant in operation or whenever required by the Employer's Representative, the Contractor must obtain a written "Permit to Work" signed by a person duly authorized by the Employer and countersigned by the Engineer.

9.1.11 Contract Terminal Points

The Contractor's responsibility for making terminal connections shall be as follows unless otherwise stated in the specification:

a) Where pipework supplied under this Contract connects to equipment already existing or supplied by the Employer or other contractors, the connections shall be made under this contract. All preparatory work for making terminal point connections such as draining, transferring the fluid, shall be undertaken by the Contractor under directives of the Employer. All follow up work such as supply of necessary equipment and tanks, clean up, etc. will be Contractor's responsibility. The Employer will not utilize his resources for such work.

b) All associated switchgear and ancillary electrical apparatus not included in this Contract will be erected and tested under the supervision of the Employer/Engineer.

c) This contract includes the terminating and connecting up of all cables which are supplied under this Contract.

d) All associated cabling not included in the Contract will be installed, connected up to the terminal boards and tested under the supervision of the Employer/Engineer, but it will be the responsibility of the Contractor under this Contract to assist the Employer/Engineer in re-checking all final connections and to ensure the subsequent satisfactory operation of the equipment.

e) Any terminal points not specified or included in the Contract documents but required for safe and reliable operation of the plant shall be deemed to be included in the scope of supply and the Contractor shall make such connections at no extra cost or delay to the Contract.

The Employer/Engineer will be responsible for the general co-ordination of the above work and for supervising all combined

testing. The Contractor shall be deemed not to have fulfilled his obligation insofar as the commissioning of the Plant is concerned until complete end-to-end tests have been carried out to the satisfaction of the Employer/Engineer.

10.0 OPERATION AND MAINTENANCE MANUALS AND AS-BUILT DRAWINGS

All of the following requirements shall be fulfilled by the Contractor.

10.1 O&M Manuals

The Contractor shall provide preliminary as well as final sets of O&M manuals containing all information and instructions for the operation and maintenance of the entire plant under his scope including systems and components from packages, consortia and joint venture partners, sub- suppliers, etc. in such number or copies as indicated above.
The information and instructions shall be in the English language and lucid in description. Separate books shall be provided for operation and maintenance.
The first volume shall be common for the O&M manuals and shall include:

- The topic of all O&M manuals
- The drawing list detailing all drawings included in the O&M manuals
- Schedules, curves, tables of performance and operation data of all major equipment and plant.

The O&M manuals are subject to review/approval by the Employer/Engineer. The Contractor shall submit the table of content and the structure of the O&M manuals for review early during the project.
The Contractor has to structure the manuals logically and uniformly independently from the source of origin, like other contractors, sub- suppliers, etc. The instruction shall be supported by drawings, photos and video films in digital media.
Contractor shall ensure that all installation, assembly, test, alignment, lubrication, calibration, pre-commissioning and commissioning records are properly prepared and handed over.
Cross section/exploded views indicating complete lists of parts, drawing references and gauge settings, together with setting dimensions, tolerances, bolt tightening torques, calibration, levels and alignment data, lubrication data and history, site repairs, modifications history, works/site test results, NDT test results including details of items failed on NDT and corrected and bearing pre-loading details and other useful data shall be provided as appropriate.
The information provided shall be complete for main and auxiliary equipment and systems provided by the Contractor. Information that does not contribute to the understanding of the design, operation and maintenance of the equipment shall be excluded from the instruction manuals where appropriate.
All material shall be free from stamps commonly used for identification of customer, order number, etc.
Precautions and warnings relative to the safety of personnel and equipment shall be included where required.
The operation and maintenance manuals and instructions to be provided by the Contractor in respect of plant supplied by him shall be supplied in loose- leaf folders.

Information should always be precise, particularly references to time intervals, which should be clearly defined and not given as ‘occasionally’ etc.
Suitable storage facility for O&M and As-built drawings shall be provided at agreed delivery locations.

10.1.1 Operation manuals

The operation manuals shall contain the following information:

1. Standard Operating Procedure
2. Pre-start-up check list
3. Shut down Check list
4. Shut down standard procedure
5. Running Equipment change over Routine
6. Operational routine tests.
7. Separate standard start-up check list for each item of equipment.
8. Trouble Shooting
9. Monitoring Operation Parameters
10. Log sheets

The operation manual shall be subdivided into different sections as:

1. Introduction
2. Brief general description of the equipment
3. Definition of terms used in the Operation Manuals
4. List of sub-systems and main components dealt with in the Operation Manual
5. Operating Principles as a summary of the technical operation principles of the Plant and main sub-systems

6. Operation Instructions for the purpose of:
7. Initial starting and running up procedures covering cold, warm and hot conditions after various shutdown periods.
8. Automatic and manual operation of the plant systems and plant items under normal running conditions, with all relevant adjustments for safe and efficient operation. Also all necessary annunciation, observations and safety precautions.
9. Normal shutdown and emergency shutdown procedures with relevant safety precautions.
10. Emergency procedures for all fault conditions in manual and/or automatic control,
11. Surveillance and data recording,
12. Periodical tests and checks,
13. Preservation procedures for long and short shutdown periods,
14. Commissioning procedures to be implemented following long and short shutdown periods,

Operation instructions shall be provided for all systems of the Plant and its overall control. The operation instructions shall be divided according to the Control room operator activities, Steam field operator activities, Engineering disciplines, the relevant systems, remote and local activities/operations
The description of the control room operation shall always be supported with screen mimics, logs, curves, listings, etc. of the Main-Machine interface.

Logic charts demonstrating the operation shall have the form of basic engineering charts and not computer system programming charts.`
The instructions shall be accurate, easy to understand, and shall contain the sequence of individual manipulations required for operation. The information shall be presented in such a manner that the contents can be used for instructing personnel in the operation of the equipment. Tables, lists and graphic presentations should be used whenever possible for making the description readily understandable.
The entire testing and adjustment procedures required for the Plant during operation shall be described along with an appropriate trouble shooting list.
The manuals shall contain periodical process data protocol sheets. Two kinds of protocol sheets shall be considered and added:

1. Empty form sheets for periodical readings, done manually by the operational staff by patrolling.
2. Sample protocol sheets from hourly protocols printed by the digital control and supervisory system for the concerned system.

10.1.2 Maintenance Manuals

The maintenance manuals shall include all detailed instructions, drawings, documents, descriptive material, equipment and spare parts lists for each equipment of the complete Plant. The maintenance manuals shall enable the Employer to maintain, repair, overhaul and re-commission/test the Plant as required.
These Manuals shall provide information in the simplest and most logical form for the purpose of

- showing the build-up and assembly of systems and plant items,
- Preventive maintenance, including frequency of inspections and cleaning,
- carrying out overhauls,
- locating and rectifying faults.
- ordering replacement parts,
- setting up, testing and adjusting plant systems and plant items.
- analyzing/ interpreting condition monitoring data.

Before any major repair, overhaul, etc. the system shall be isolated and the necessary work permit procedure shall be lanced. After the work was done, the system shall be reactivated and re-commissioned again.
The necessary procedures, forms, labels, etc. shall be contained in the
Operation and Maintenance Manuals like:

- Work Permit Procedure
- Procedure of Isolation of the systems, system limits, marking of limits, isolation points, etc. for each system in the Plant
- Warning labels and procedures
- commissioning procedure for system re-commissioning
- System clearance procedures, etc.

The Maintenance Manuals shall contain also the following information:

- Special tools required for execution of the work

- Detail drawings of spare parts, clearance, allowance, etc.
- Test procedure
- List of valves with all entire components (material, size, clearance, etc.)
- List of pumps with all entire components (material, size, clearance, etc.)

The Contractor may propose his standard procedure, which shall be revised and adapted to the Plant and to the local customs by the Contractor with the co-operation of the Employer's station staff.

10.1.2.1 Preventive Maintenance

The section with the preventive maintenance shall indicate the inspections required at regular intervals, the inspection procedure, the routine cleaning and lubricating operations with lubricating charts, the regular safety checks, the regular instrumentation and control check and calibration activities and similar steps.
The As Built drawings belong to the Maintenance Manuals and shall be referred to, wherever necessary.
The maintenance instructions shall include a tabular summary of the required activities sorted according to:

- Daily
- Weekly
- Quarterly
- Yearly
- Other cycles as applicable and shall be done separately for the different disciplines like mechanical, electrical, I&C, etc.

Any necessary instructions and details shall be included, like tools and procedures or shall be referred to other sections, like spare parts, corrective maintenance, etc.

10.1.2.2 Corrective Maintenance

This document shall provide the maintenance engineers with a brief and yet fully comprehensive information including all references to the applicable, detailed service and maintenance instructions.

Further sections sub-divided in principle according to the structure for the operation manuals. Each sub-division shall include:

- Detail information regarding repair, replacement and adjustment, describing the inspection, fitting and dismantling of parts, fault tracing as well as repair and adjustment procedures, including set points and tolerances.
- Spare part lists, containing all the necessary data for ordering spare parts. These lists shall include all spare parts; those to be supplied and those not to be supplied under the present Contract.
- Tool lists, containing all necessary data for identification of tools.
- List of suppliers and alternative suppliers and addresses.

10.1.4 Execution of Manuals

10.1.4.1 General

Operation and Maintenance Instructions shall be prepared in a uniform layout and in a coordinated way. The manuals of the different sub-suppliers shall be coordinated, revised and integrated by the Contractor to ensure such uniform layout and content.
The Employer/Engineer reserve the right to specify the final type of a uniform cover to be used for all O&M manuals. The colour of the covers for the Operation and for the Maintenance volumes shall be slightly different. The Contractor shall not be entitled to claim extra payment for this requirement.
The final size of drawings for the O&M manuals shall be decided by the Employer/Engineer. Catalogue sheets, illustrations and printed specifications, shall be checked and prepared by the Contractor in such a way that the figures, statements and data valid for the delivered sizes and types of the equipment concerned are clearly marked. All figures, statement and data valid for sizes and types not delivered must be crossed out.

Detailed description shall contain a complete and accurate description of the equipment, all components and ancillaries, their assembling and dismantling. An accurate list stating clearances, tolerances, temperatures, fits, etc. shall be included. In the case of material and equipment for which no drawings are required, the Contractor shall include prospectus giving descriptive data allowing for a proper evaluation of the material or equipment, as required for maintenance and repair.

10.1.4.2 Form of Manuals

Each Book shall contain a Table of Contents showing

- The comprehensive and complete Table of Contents of ALL Manuals
- Table of Contents of the concerned Book.
- Table of illustrations, drawings

Use of transparent plastic envelopes is to be avoided. All drawings should be in A3 or A4 format, keeping however a good readability.
In case when more pieces of size A3 drawings folded in A4 size are attached to the documents, distance strips shall be inserted between the drawings to avoid getting the description sheets corrugated.
Separation sheets with index tags are to be provided between chapters. Moreover, separation sheets with index tags are to be provided between main parts of one chapter, if necessary, with proper numbers.
The numbering in the chapters should be consequent and uniform in all manuals.
The page numbers shall restart for each chapter. Continuous numbering for a whole Book or Section cannot be accepted.
Any reference to other parts of the Manuals shall contain the whole path description (e.g. Volume-Section-Chapter, as applicable), not only the file name. References to the very same Book should contain e.g. Chapter number and page number.
Pages should always have clear and complete identification. Especially drawings, frequently taken out from the file must have clear designation.
The text should be in grammatically correct and the use of technical terms should follow the known terminology

10.1.4.3 Content of Manuals

The logical segregation of the Operation and Maintenance Manuals shall be carefully planned.
The operation shall mainly concern the proper operation of the systems, including priming, starting, normal operation, emergency operation, shut down, system trouble shooting, re-commissioning and testing of systems. For the digital system the same rules shall be obeyed, e.g. the system engineer's operational task is to operate the system configuration/programming and diagnostic workstation, including reconfiguration of control loops, adding/deleting inputs, signals, etc.
The maintenance is component oriented, and includes the periodical/preventive and corrective maintenance, re-calibration, cleaning, etc., on equipment, further the procedure restoring the original features by repair, like isolation, dismantling/disassembling, repair, assembling, component testing and reinstallation.
Where any equipment, valve, pump, transmitter, switch, gauge, etc. is mentioned, the Plant identification number shall be added.
Uniform description is to be used for the systems/components following the denominations used in the documents, identification labels, HMI interface, etc. All documents originated by sub-suppliers, etc. shall be revised in this respect.
The abbreviations in the official List of Abbreviations are to be used. The List of Abbreviations shall be attached to each Volume of the manuals.
Basic documents necessary to the interpretation of the documentation are to be included in the Manuals.
Complete and unabridged manufacturer descriptions/user manuals are to be provided for devices/instruments. Titles shall be clear and comprehensive.
The system descriptions should always be accompanied by simplified representation of the system, block schemata, etc. in A4 size for easy understanding (e.g. simplified P & I diagram with instrumentation showing also control functions).
For programmable electronic devices the actual setting data with all parameters has to be attached to the Manuals for each application. This includes all positions adjusted on keyboard, position of jumpers, switches, calibration of potentiometers, downloading of programs, etc.

10.1.4.4 Drawings in the Manuals

Documents inserted from the existing approved/As Built documentation may keep their cover page for easy identification.
New documents prepared especially for the manuals or non-contractual documents are to be inserted without cover page and without drawing head.
Obviously, all documents in the Manuals taken over from the Plant documentation shall have the Contract As-Built status, shall have received the Approved or for Info status during the approval procedure and shall contain all requested and agreed modifications and shall reflect the actual situation.
In the final As-built drawings and other documents shall already contain all correction and rectification done during the commissioning period (the so-called "redline" corrections).

10.1.4.5 Electronic Files

The O&M Manuals shall also be prepared and submitted on electronic data carrier (CD-ROM) in an interactive software base. One set of CD-ROMs shall be attached to each of the set of the preliminary and to the final submission of the manuals. The software shall allow easy search for information/drawings.
The program used to read the manuals shall allow easy navigation in the documents. Indices on different levels with on-line links shall provide quick access to the indicated subject. All internal references in the documents shall also have to be linked to the referenced subject with possibility to quick return to the original subject. This shall also be applicable between the
Manuals and different lists of Spare Parts, Lubricants, Consumables, etc. The Manuals shall be linked to the Plant

Maintenance and Document Management System.
Further, any list, database, schedule specified as to be available in computerized form shall be available on CD-ROM using the original file format (e.g. EXCEL), like

- List of all measuring points (established list of local and remote measurements, including me /O's, alarms, set points, calibration values, etc.)
- List of valves
- List of cables
- Terminal point lists
- List of consumables
- List of valves
- List of Spare parts
- List of consumables

DCS/SCADA system programs (where applicable) to be downloaded are to be attached to the Manuals on suitable data carrier.

10.2 As-Built Drawings

One (1) month prior to the start-up of the completed works, the Contractor shall submit the list of proposed As-Built drawings to the Employer/Engineer for review/approval.
The Contractor shall provide As-Built drawings of the entire Plant documenting the final design after completion of installation and commissioning. For preparing the As-Built drawings all modifications and changes made during the installation and commissioning phase shall be incorporated into the respective approved design drawings.
The Contractor's Site staff shall incorporate by hand all modifications and changes into the approved design drawings (red-line drawings). Subsequently, these drawings, which shall be considered as Preliminary As- Built drawings, will be reviewed by the Employer's/Engineer's Site staff. Upon receipt of comments, if any, the Contractor shall distribute copies of the preliminary As-Built drawings as per document distribution schedule.
The Final As-Built drawings will be prepared by the Contractor based on the preliminary ones. Once completed, they shall be incorporated into the O&M manuals and shall be filed in a separate as built drawing book.
The Contractor shall submit CD - ROMs along with all „As-Built "drawings according to the document distribution schedule. The software used shall be compatible with the Employer's existing system for the above purpose.
Nevertheless, the Contractor shall provide to the Employer all necessary hardware facilities and ready installed and customized software program packages in the scope of the present Contract to read and to print the As Built documents, including A4-A3 format colour inkjet printer of professional quality and plotter allowing printing of the full size and reduced site drawings.

Each one set of the Final As-Built drawings shall contain the followings:

- Three (3) sets of reduced size general arrangement P&I diagrams in loosely bound form.
- Nine (9) sets of prints of each drawing.
- Nine (9) sets of CDs.

11.0 QUALITY MANAGEMENT REQUIREMENTS

11.1 General

The Contractor shall carry out the Contract Works in accordance with sound quality management principles, which shall include such controls as are necessary to ensure full compliance with all requirements of the Specification. The Contractor's activities will be monitored by the Employer/Engineer to ensure that they are being implemented correctly.

11.2 Scope

These quality management requirements shall apply to all activity during design, procurement, manufacturing, inspection, testing, packaging, shipping, storage, site erection and commissioning.
The Contractor shall have sole responsibility for ensuring compliance with each of these requirements as applied to the whole of the Contract Works, and shall ensure that subcontractors implement those quality control activities that are appropriate to the extent of their supply.

11.3 Document Submittal

In addition to any document submittals required by other parts of the Specification, the Contractor shall forward the Quality Control documentation to the Employer/Engineer as indicated in the following items.
Additionally, the following documents shall be submitted with the necessary details during the execution of the Contract.

a) Identification of main items to be supplied, with names of supplier and manufacturer (if different from supplier and location of place of manufacture).

b) Manufacturing programs for each major item of equipment, showing main stages of design, procurement, manufacture, inspection and testing.
c) Site erection and commissioning program, showing all controls, inspections and tests.

11.4 Particular Requirements

These particular requirements identify the elements of quality control considered necessary to ensure compliance with specified Contract requirements and it is these elements that the Employer/Engineer will examine to verify that compliance has been achieved.

Details of the structure and methods used for establishing and implementing these control elements are not stated, since there are many acceptable ways of achieving a satisfactory system of control. Manufacturer's established structure and methods shall be used whenever these are capable of complying with the particular requirements stated in the following Clauses.

11.4.1 Organization

The Contractor shall establish an organization for the control of quality, and all personnel so designated shall have defined responsibilities and the authority to identify and evaluate quality problems, and to ensure that adequate remedial actions are implemented.

The Contractor shall ensure that responsibilities are assigned for advising the Contract requirements to subcontractors and manufacturers, and the monitoring of compliance with those requirements.

11.4.2 Planning

The Contractor, immediately after Award of Contract, shall perform a complete review of the Contract and take timely action to ensure that the necessary quality control procedures and provisions are established in accordance with this Specification, purchase order, applicable codes and standards, or other Contract Documents.

Particular care shall be taken to identify any specified requirements that are different from or additional to a manufacturer's normal design or quality control practice, and to initiate the necessary measures to ensure that such additional requirements are implemented satisfactorily.

The Contractor shall prepare a quality plan for the complete Contract Works, and shall require individual manufacturers to prepare detailed quality plans for all main items of equipment. Quality plans (I&T Program) shall identify all inspections and tests, which are to be carried out, including those necessary to verify compliance with particular specified requirements.

11.4.3 Procurement document control

The Contractor is responsible for ensuring that all procurement documents issued to subcontractors contain or reference all applicable requirements specified in the Specification which are necessary to enable the Contractor to fulfil those requirements. The Contractor shall also verify that all subcontractors' purchase orders onto manufacturers or other suppliers similarly identify all applicable requirements.

11.4.4 Documentation and change control

The Contractor shall establish measures to control all documentation that relates to the quality requirements specified in the Specification. The measures shall ensure that only current issues of documents are used at all manufacturing and control points.

11.4.5 Control of purchased material, equipment and services

The Contractor shall be responsible for ensuring that all purchased material, equipment and services conform to Contract requirements.

All purchased material or equipment shall be subjected to inspection control by the Contractor, either on receipt, or before dispatch from the manufacturer's works.

No material or component shall be obtained by a Contractor or his Sub-contractors from any source which has not been previously audited by a responsible party and designated as an approved supplier.

The Employer/Engineer may, at his discretion, require evidence that such audits have been satisfactorily made and/or evidence of the competence of the designated supplier to meet the necessary quality requirements.

11.4.6 Control of Inspections & Tests

The Contractor shall ensure that all manufacturer's inspections and tests are satisfactorily carried out, in accordance with the planned program and that the date recorded is acceptable. On completion of manufacture, sufficient inspection and testing shall be carried out to complete the full verification that all equipment conforms to all specified requirements.

11.4.7 Handling, Storage & Delivery

The Contractor shall ensure that adequate and controlled measures are established for cleaning, protection, preservation, packing, handling, storage and shipping, to protect items from damage, deterioration or loss. When the nature of the item

dictates the need for special handling equipment, this shall be specified and verified by the Contractor.
The identification, marking and labelling of items of shipping shall comply with contractual requirements, and shall be applied in a manner that will ensure no loss of identity and permit permanent and easy recognition of special handling and storage requirements.

11.4.8 Inspection & Test Status

The Contractor shall ensure that measures are established for all material and items that will provide the ability, at any point of manufacture, to determine that the manufacturer's planned inspections and tests up to that point have been carried out.

11.4.9 Site Installation & Commissioning

The Contractor shall ensure that all Site installation and commissioning controls, inspections and tests, are carried out in accordance with the planned program, and that data recorded is adequate to permit the Employer/Engineer to verify that the whole of the Contract Works are in full compliance with all Contract requirements.

11.4.10 Implementation

In order to achieve the Quality Management Requirements specified above, the Contractor shall designate two senior engineers with sufficient authority who will be solely responsible for the Quality Management of the Project. These engineers shall be independent of any other design, manufacturing, inspection, testing and site erection 'activities associated with this Contract.
One engineer will be responsible for all activities associated with design, procurement, manufacture, inspection, testing, packing and shipping whether undertaken by the Contractor, or by his designated subcontractor or supplier and will normally be resident at the Contractor's Head Office or principal place of Work. The other engineer will be responsible for all activities associated with site erection and will be resident at the Contractor's Site Office.
The main responsibilities of the Quality Management engineers are given below:

11.4.10.1 Head Office

a) Production and implementation of all Quality Manuals (Q.M.), Quality
b) Standards (Q.S.) and test and inspection programs for all materials ordered.
c) Verifying/Certifying that all design and drawings prior to submission to the Employer/Engineer are in accordance with the Specification and all relevant Standards Codes of Practice.
d) That all orders placed for materials are in accordance with (1) above, and that only the latest revisions of approved drawings are used in the course of man.
e) That all manufacturers/suppliers have acceptable Quality Control (Q.C.) procedures and that these have been implemented throughout the execution of the work. All Q.Cs. shall be submitted for approval to the Employer/Engineer prior to their implementation.
f) That all tests and inspections are undertaken to agreed Standards and Codes of Practice.

11.4.10.2 Site Office

a) Production and implementation of all Quality Manuals (Q.M.), Quality Standards (Q.S.) and test and inspection programs for all materials ordered. All Q.Ms. and Q.Ss. and programs shall be submitted for approval to the Employer/Engineer prior to implementation.
b) That only the latest revisions of approved drawings are used during the execution of the work and that no drawings stamped "This Drawing Subject to Approval" is available for use on site.
c) That all orders placed for local materials are in accordance with paragraph (1) for Head Office.
d) That all work is executed in accordance with the requirements of the specification and all relevant Standards/Codes of Practice.
e) That all tests and inspections are undertaken to agreed Standards/Codes of Practice.
f) That all terminal points of supply (interfaces) are taken care of in line with the Specification and according to the Plant requirements.

PART B: TECHNICAL SPECIFICATIONS FOR MATERIALS, EQUIPMENT AND WORKS

1.0 PIPING SPECIFICATIONS

Design code: ASME B31.1
General Material: CARBON STEEL A53Gr.B

Item	Size	Description	Material Specification

PIPE	½”-36”	SEAMLESS CARBON STEEL SCH 80 or XS or Scheule 40 where applicable	A 53Gr. B or A106 or API 5l Gr. B
PIPE NIPPLES	½”-2”	SEAMLESS CARBON STEEL PBE, TBE, TOE SCH 80 (CUT FROM PIPE)	A 53Gr. B or A106 or API 5l Gr. B
FITTINGS -WELDOLET(MSS SP 97) - ELBOLET (MSS SP 97) -SOCKOLET (MSS SP 97) - COUPLING -UNION (MSS SP -83)	½” -2”	FORGED CARBON STEEL CLASS 3000 BUT WELDED TO ASME B16.11 CONNECTIONS TO BE CARBON STEEL, SOCKET WELD UNLESS OTHERWISE STATED.	ASTM A105
-PLUG SQ OR HEX HEAD -CAP SQ OR HEX HEAD -REDUCING BUSHING HEX HEAD -THREADOLET (MSS SP -97) -ELBOLET (MSS SP -97) -UNION (MSS SP - 83)	1/2” -2”	FORGED CARBON CLASS 3000, SCREWED NPT TO ASME B 1.20.1	ASTM A105
-90^0 ELBOW -45^0 ELBOW -TEE -REDUCING TEE -CONCENTRIC TEE -ECCENTRIC TEE -CAP	½” - 24”	CARBON STEEL, BUT WELD TO ASME B 16.9	ASTM A234 Gr. WPB
FLANGES	½” – 1 1/2”	WELD NECK OR SOCKET WELD OR SOCKET WELD FORGED CARBON STEEL CLASS 900 WITH RAISED FACINGS, ASME B16.5	ASTM A105
	2” -24”	WELD NECK FORGED CARBON STEEL, CLASS 900 RTJ TO Gr. II ASME B16.5 GROOVE TO SUIT RING DETAIL	ASTM A105
	½” – 1 ½”	BLIND FLANGE, FORGED CARBON STEEL CLASS 900 WITH RAISED FACINGS TO ASME B16.5	ASTM A 105
	2” – 24”	BLIND FLANGE, FORGED CARBON STEEL CLASS 900 RTJ TO ASME B16.5	ASTM A 105
BOLTS		STUD BOLT, CARBON STEEL TO ASME B 18.2.1 UNC THREAD TO ASME B1.1	ASTM A 193 B-7
NUTS		HEAVY HEX NUT, CARBON STEEL TO ASME B 18.2.2 UNC THREAD TO B1.1	ASTM A 194 – 2H
GASKETS	½” – 24’’	316SS, 0.175” THICK METALLIC WINDING 0.125” THICK CENTRE RING, GRAPHITE FILLER, FLEXTALLIC STYLE CGI WITH 316SS INNER RING.	
	2” – 24”	SOFT IRON OCTAGONAL RING TO SUIT CLASS 600/900/1500 ASME B16.5 RTJ FLANGE	

NOTE

1. BORE OF FLANGE TO MATCH ID OF PIPE.
3. WELDING ENDS TO MATCH PIPE SCHEDULE OF CONNECTED PIPES.
4. LSAW PIPE TO BE 100% RADIOGRAPH TESTED WITH E = 1.0

ABBREVIATIONS

LR -LONG RADIUS WITH A RADIUS OF 1.5 X DIAMETER OF THE COMPONENT
PBE- PLAIN BOTH ENDS
RF -RAISED FACE
TBE -THREADED BOTH ENDS
TOE -THREADED ONE END
WN WELD NECK

2.0 VALVES

2.1 Gate valves

Valves should meet the following requirements:

- Basic design in accordance with applicable requirements of API 602 specifications.
- Wall thickness should be in accordance with API 602.

- Ends flanged and drilled in accordance with ANSI B16.5 / ASME B16.47
- Face to face dimensions to be in accordance with ANSI B16.10.
- Pressure/temperature rating to be in accordance with ANSI B16.34
- Pressure test to be in accordance with API 598.
- Materials for various parts of the valves should be as follows
    a. Body to be cast carbon steel to ASTM A216 Gr. WCB
    b. Seat to be carbon steel to be ASTM A105
    c. Shaft to be stainless steel ASTM A564 Gr. 630
    d. Gate to be Cast stainless steel to be ASTM A217 Gr, CA15
    e. Bonnet to be cast carbon steel to ASTM A216 Gr. WCB
    f. Basic Design and wall thickness to be in accordance with applicable requirement of API 600 specifications
    g. Ends flanged and drilled in accordance with ANSI B16.5
    h. Pressure test to be in accordance with API 598 standard
    i. The wheel to be manually operated.
    j. Bevel Gear operated for 10 inches and above
    k. The flanges of rating class 300 and below to be raised face while class 600 and above should be Ring type joint (RTJ).

2.2 MOTORISED VALVES

2.2.1 Design Requirements

2.2.1.1 General

Actuators shall be designed for valve operation to ensure proper function in accordance to EN 15714-2:2010 electric actuators for industrial valves - basic requirements depending on application actuators shall be designed for ON-OFF, short-time duty according to IEC 60034 (S2-15 min) respectively Class A and B according to EN 15714-2 or MODULATING, intermittent duty (S4-25%) respectively Class C with up to 1.200 starts per hour; no. of starts depending on actuator size and output speed.

Actuator shall have a design life of 10.000 OPEN-CLOSE-OPEN cycles, each consisting of 30 turns per sense of rotation and must be suitable for operating in any mounting position. Actuator design must provide simple setting, testing, maintenance and repair.

Actuator settings shall be performed non intrusive via push-buttons at motor control without special tools or instruments (e.g. battery backed setting tool). A wireless Bluetooth interface shall be available. Microsoft Windows™ based software running on a conventional computer shall be available to allow actuator set-up and diagnoses.

Electrical connection of actuators to be multi pin plug and socket connector, allowing quick disconnection in case of maintenance or repair. In order to prevent loss of screws during commissioning or maintenance, all covers shall be fixed with captive screws. In order to minimize the amount of spare parts required, parts such as covers, plug and sockets, parts must be interchangeable throughout all model sizes.

Torque-transmitting housings must be made of cast iron, except motor housing. No plastic parts of any type shall be used, except for electric / electronic components, operating knobs / levers, indicator mechanism and sealing elements as far as applicable.

Depending on valve application, actuators shall be self-locking. Self-locking shall remain active if actuator is switched to hand-operation-mode. For non self locking actuators with high output speeds a mechanical anti-back drive device shall be provided attached to the actuator.

Valve mounting dimensions shall be according to ISO 5210 with use of a plug sleeve connection adapting to valve shaft. For rising stem applications, actuator design must allow actuator removal from output drive without disturbing the valve function.

2.2.2 Electric motors

Motors must be suitable for operating at 3 phase power supply voltage of 415Volt AC (+/- 10%), 50Hz (+/- 2%) and shall be specifically designed for valve-actuator operation, characterized by high starting torque, low stall

torque and low inertia. Motors shall be totally enclosed non ventilated type (TENV). Motor housings and covers to be made of sea water resistant aluminum. Motor-insulation must be in accordance with IEC 85 Class F (155° C). Motors must be protected by 3 thermal monitoring devices, which are embedded in motor windings. Motor connections shall be internal by means of plug and socket.

Motors must be totally separated from lubricant-filled gearing of actuator, allowing replacement of motor without loss of lubricant regardless of mounting position. Motors shall have a dog coupling as mechanical connection to actuators worm shaft.

Actuator motors must develop full torque when power is turned on. All motors shall be of high starting torque type to facilitate 'unseating' of the valve. Each motor shall have a rating plate marked in accordance with IEC 34.1 as far as applicable.

2.2.3 Sizing

One actuator size (same outside dimensions) shall be available covering output speeds from 4 to 180 rpm for a given torque range, to avoid over sizing and unnecessary weight load on valve stem, flange and yoke. An increase of actuator size caused by higher actuator output speed is not acceptable to avoid weight over sizing of actuators. Actuators must be selected to provide sufficient torque required for safe valve operation. Actuator output torque must be available at 90 % of nominal voltage.

In order to enable proper sizing of applicable electric equipment, actuator supplier has to disclose current value at maximum setting torque. Actuator shall be capable of opening and closing the valve against full differential pressure within specified time on valve data sheet.

2.2.3.1 Limit and Torque Monitoring

No battery backed limit sensing shall be used to avoid actuator malfunction in case of power failure. Actuators shall have a hall sensor principle based absolute encoder for limit sensing with a resolution of 3° or better. Actuator shall not be equipped with a battery.

Torque sensing shall be of mechanical sliding worm principle with torque values independently setable for 'OPEN' and 'CLOSE' direction. No electronic torque sensing derived from motor current or piezo-electric torque sensing at worm shaft. Torque setting shall be possible for 40% to 100% of rated torque.

2.2.4 Diagnosis

Actuators installed in critical applications, shall be optionally equipped with a sensor package, consisting of torque, temperature and vibration diagnosis. In this case actuators shall also have a real time clock for event recording to support asset management functions and life cycle analysis. Display indications shall follow NAMUR recommendations with simplified status indications, operation log and torque curves.

2.2.5 Motor and local controls

Integral motor controls shall be microprocessor based and include mechanically and electrically interlocked reversing contactors for ON-OFF duty and solid state contacts (thyristors) for MODULATING duty actuators.

Local controls shall consist of motor controls, push buttons OPEN-STOP–CLOSE–RESET, lockable selector switch LOCAL-OFF-REMOTE and a wireless Bluetooth interface with separate indication showing wireless connection as active, as well as LCD graphic display clearly visible under all lighting conditions with plain text and in world languages, diagnosis symbols, graphs. Five indication lights, available in different color codes, showing status information such as end position open/close, torque fault in both directions and motor protection tripped.

Local controls shall be electrically attached to actuator via plug and socket connection. It shall be possible to re-position local controls at every 90°, so that push buttons and indication lights will face the operator.

In case actuators have to be mounted in difficult to access positions, it shall be possible to separate local controls (including motor controls) from actuator. A wall bracket shall be available to mount local controls / motor

controls near valve actuator for distances up to 50 m cable length.

Depending on detailed project design, actuator version shall be as follows:

1. ON-OFF, short-time duty S2-15 min with hard wired signals OPEN-STOP-CLOSE, including a 4-20mA output signal, internally powered. Detailed wiring diagram to be supplied with submittal documents.
2. MODULATING, intermittent duty S4-25% with hard wired communication via 4-20mA input signal, including a 4-20mA output signal, internally powered. Detailed wiring diagram to be supplied with submittal documents.

Detailed wiring diagram shall show all relevant signals such as valve position, end positions (OPEN/CLOSE), selector switch position and high torque alarm in OPEN/CLOSE direction. In addition to this, actuator must provide a dedicated fault signal if there is a phase failure, motor protection tripped and/or high torque in OPEN/CLOSE direction or if hand wheel is engaged.

All control signals as well as main power supply must be wired to a multi pin plug and socket for customer connection. Terminal compartment shall provide sufficient space to accommodate the possible maximum number of incoming wires. A minimum of three cable entries must be provided for motor power cable and digital/ analogue inputs and outputs. Each cable entry shall be properly sealed by cable glands during site installation. Cable glands shall be chosen by contractor, responsible for wiring during commissioning phase.

Each actuator shall provide an adequately sized internal and external connection for grounding.

2.2.6 Anti-condensation heater

In order to prevent condensation, a heater must be installed inside the actuator, suitable for continuous operation. Actuator must provide an alarm signal in case of failure of anti condensation heater.

2.2.7 Hazardous Area Certifications and Enclosures

Electrical actuators and accessories shall be certified II2G Ex d or de for use in ZONE 1Group IIC and temperature class T3, according to ATEX directive 94/9/EC.

Protection class of actuator, including motor, shall be IP 68, according to EN 60529 against submersion up to 8 m head of water for at least 96 hours. During submersion it must be possible to operate the actuator at least 10 times.

2.2.8 Hand wheel

Actuators must be equipped with a hand wheel for manual operation. Clockwise operation of hand wheel shall cause clockwise movement of output drive. Hand wheel shall be clearly marked with an arrow and the word 'CLOSE'.

Hand wheel engagement shall be of spring loaded push mechanism type and required manual declutching. Actuator must provide a switch signal when in manual mode.

Under manual operation, hand wheel shall drive the worm shaft. Self locking shall be maintained in hand operation. Motor must be disengaged during manual operation. Hand wheel shall automatically disengage when the electric motor is energized.

Hand wheel must be sized allowing easy manual operation of output drive. The over torque indication shall be active in manual operation as well as motor operation, thus allowing a signal to be provided when the set-torque has been reached.

2.2.9 Bearings and gears

Bearings shall be of antifriction or self-lubricating type. Bearings shall not require any maintenance between general overhauls. Power gears shall be made from heat treated steel. Worm-wheels shall be made of bronze material. Actuator gear housing shall be filled with an adequate quantity of lubricant. Re-lubrication between general overhauls shall not be required.

2.2.10 Noise level
Under all operating conditions the noise level of actuators shall not exceed 75 dB(A) at 1 m.

2.2.11 Name plates
Two nameplates, made of aluminum, shall be attached to each actuator; one on the motor housing, showing all relevant motor data, one on the actuator housing showing all relevant actuator data. Special information, such as valve tag no., shall be shown if required. Nameplates shall be securely fixed to actuator and motor, so that they cannot be removed or scratched off during shipment, installation, operation or maintenance.

2.2.12 Painting and corrosion protection
Actuator corrosion protection shall fulfil the requirements of EN ISO 12944-2, classification of environments C4 with a specified salt spray test of 720h. Actuator painting must be performed in such a way, that no corrosion takes place under ambient conditions as specified. All outside screws or bolts shall be made of stainless steel (A2). Actuators shall be corrosion protected with a prima coating and a two layer powder coating consisting of an epoxy primer coating and a polyurethane top coating with a total film thickness of at least 140µm. Final color shall be silver grey similar to RAL 7037.

2.2.13 Inspection and Testing at Manufacturer's work
Each actuator shall be factory tested. Tests shall be performed in accordance with IEC standards as far as applicable. A final inspection record shall be supplied with each actuator showing general actuator data, nominal current, no load current, starting current, power factor at rated torque, output speed, torque setting, limit setting (turns/stroke), high voltage test, functional test (including all options) and visual test.

2.2.14 Documentation
Supplier to provide storage- installation- and operation instruction as well as electric wiring diagram, dimensional drawings and technical data sheet including motor data as per manufacturer standard.

2.3 BALL VALVES (½'' to 2'') - For Condensate Drain Pots

- Trunnion mounted ball valve
- Ball valves 2”
- To have carbon steel WCB body
- 316 stainless steel trim
- Locking handle
- Bottom loaded blowout proof stem
- NPT or Socket welded
- Adjustable packing gland
- ANSI B16.34
- Class 150 wall thickness
- Mineral Filled PTFE seats
- -50°F to +1000°F temperature range

3.0 RAPTURE DISCS
a. The rapture disk to be universal Reverse acting type.
b. For two phase (vapour and liquid) service

c. Operating Ratio: 90% of Marked Pressure or 95% of the low side of the applicable performance/rupture tolerance for burst pressures greater than 40 psi or 90% of the low side of the applicable performance/rupture tolerance for burst pressure less than 40 psi
d. Should be manufactured and certified to ASME Section VIII paragraphs UG 125 through UG 137
e. The material of construction should be resistant to corrosive geothermal service fluids.

Holders

The URA rupture disk is designed for use in the “URA-I” or “URA-PT” pre-torque insert-type design

The flat “bite- type” seal makes the assembly leak-tight without the need of any gaskets. The outlet bore has the same cloverleaf shape to provide support to the shear ring for higher pressure disks

The URA-I and URA-PT holders are designed to fit between standard pipe flanges.

4.0 INSULATION AND CLADDING

Insulation should be calcium silicate with specifications according to C 533 – 95.

The cladding material to be 1 mm thick Aluminium sheet that will be factory painted with colour that will be agreed with the Employer.

5.0 PIPE SUPPORTS

- Minimum concrete cover to reinforcement shall be 75mm
- All structural concrete shall have a minimum compressive cubic strength of 30Mpa at 28 days,
- Reinforcement shall be deformed bars Grade 460 A type 2 or Grade 460B type 2 conforming to BS 4449 - 1997.
- Pipe columns to be Grade 275Mpa steel, Seamless to ASTM 53, ASTM 106 and API 5L.
- Tolerances for pipe installation of pipe supports;
    - Maximum tolerance on plain location of steel column shall be 25mm in any direction.
    - Maximum tolerance on top elevation of steel column to shall be 25mm.
- Steel pipe columns to be cast directly into concrete foundations clean pipe column of any dirt, oil and grease prior to placing pipe columns shall be shop primed down to a depth of 200mm below the top of concrete prior to casting.
- Contractor to paint welds and interface between steel pipe column and concrete after installation of pipe support heads where paint will not seal shrinkage cracks between pipe column and concrete fill cracks with non-shrinkage cement based grout before painting.
- The minimum embedment depths are based on volcanic ash. If during excavation it is found that soil is different, contact the Engineer for revised embedment requirements.
- The contract may choose to fully embed the pipe column in the pipe.

6.0 SOFTWARE

The contractor will purchase a suitable stand alone pipe design and simulation software in readiness to hand over to the Employer. The software should be genuine and authorized by the manufacturer for use in East Africa. The contractor shall train the employer staff on the use of the software during the contract period. The training period shall be agreed upon by the employer and the contractor and shall not be less than 10 days.

7.0 STAFF TRAINING

The contractor will arrange a training for a period of at least 8 weeks in Steam field design to be achieved as follows.

- The contractor to procure a well reputed Consulting firm with experience in Steam field design and supervision to offer the training.
- The training to be carried out at the Consultants offices so that members of staff can interact with various skilled personnel on different aspects.
- The members of staff to be trained will include
    1. 1 No. Civil structural Engineers.
    2. 5 No. Mechanical Engineers
    3. 4 No. Electrical Engineers
    4. 2 No. Instrumentation and Controls
- The costs to be incurred by the contractor will include Cost of paying the training firm, facilitation of travels and coordination of the training to success and local transport while in the country of the training.

8.0 TRAINING AREAS

The training will cover the following aspects:

- Geothermal Steam Field Management
- Design of geothermal power plants
- Process design of geothermal Steam field and power plant.
- Sizing of all Steam field components which include, pipes, valves, separators, Atmospheric flash tanks, steam traps, insulation and cladding, rapture disks, Vent stations and their control valves.
- Mass and Heat balance
- Design of Steam field Process flow diagrams and P&IDs
- Overview of Chemistry in Steam field flow process
- Steam field Mechanical design
- Stress analysis in Steam field design
- Design of pipe supports for Steam field
- Civil and structural design pipe supports
- Corrosion control
- Testing and commissioning of geothermal Steam field.

- SCADA and PLC training compatible to the existing system in Menengai
- Classroom training on Non Destructive testing and certification at KEBS (Kenya Bureau of Standards)

The contractor shall cover all cost inclusive training, travel expenses and accommodation for the staff to be trained
The contractor will prepare a proposal covering all the above aspects of Steam field design to be considered during evaluation. Training materials shall be handed over to the employer.

9.0 ASME STANDARDS AND DESIGN BOOK

9.1 ASME STANDARDS

- ASME B31.1 Power Piping Design Code
- ASME B31.3 Process Piping Design Code
- ASME VIII Div 1 Boiler and Pressure Vessel Design Code, Division 1: Rules for Construction of Pressure Vessels.
- ASME VIII Div 2 Boiler and Pressure Vessel Design Code, Division 2: Alternative Rules.
- ASME B16.5 Pipe Flanges and Pipe Fittings
- ASME B16.9 Factory Made Wrought Butt-welding Fittings
- ASME B16.10 Face-to-face and End-to-end Dimensions of Valves
- ASME B16.11 Forged Fittings, Socket-welding and Threaded
- ASME B16.20 Metallic Gaskets for Pipe Flanges - Ring-Joint, Spiral-Wound and Jacketed.
- ASME B16.34 Valves - Flanged, Threaded and Welding End
- ASME B16.36 Orifice Flanges
- ASME B16.47 Large Diameter Steel Flanges (Series A Flanges)
- ASME B18.2.1 Square and Hex Bolts and Screws
- ASME B18.2.2 Square and Hex Nuts
- ASME B36.10M Welded and seamless wrought steel pipe
- ASME B36.19 Stainless Steel Pipe
- ASME B73.1 Horizontal End Suction Centrifugal Pumps for Chemical

9.2 ASTM STANDARDS

- ASTM A36 Specification for Structural Steel
- ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc coated
- Welded and Seamless
- ASTM A106 Specification for Seamless Carbon Steel Pipe for High-
- Temperature Service
- ASTM A193 Alloy Steel & Stainless-Steel Bolting Materials
- ASTM A194 Carbon & Alloy Steel Nuts
- ASTM A283 Specification for Low and Intermediate Tensile Strength
- Carbon Steel Plates
- ASTM A516 Specification for Pressure Vessel Plates, Carbon Steel, for
- Moderate and Low Temperature Service

9.3 ANSI/MSS STANDARDS

- SP-58 –2018 Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation

9.4 STEAMFIELD DESIGN BOOK

- Geothermal Engineering Fundamentals & Applications by Arnold Watson

10.0 FACTORY ACCEPTANCE TESTS

The following factory acceptance tests will be attended by the Employer staff

1. PIPES
2. VALVES
3. FLOW METERS
4. SEPARATORS

The Employer will take care of Air tickets for 4 No. staff for each FAT trip, accommodation, airport transfers while the Contractor will facilitate visa applications, local transport at the manufacturer's country and factory visits.

11.0 PRELIMINARIES

Preliminaries will comprise but not limited to the following items;

a) Mobilization
b) Standard and equipped site office
c) Performance bond
d) All relevant Insurances as will be agreed by the Employer
e) Seeking for any relevant licenses and approvals from relevant authorities
f) Third party inspections where applicable
g) Compliance to Health and safety requirements
h) Maintenance and operation manuals
i) Storage of materials
j) Electricity and other utilities for construction.
k) Demobilization

12.0 PROJECT VEHICLES

The contractor shall purchase and provide three (3) project vehicles which shall be handed over to the employer at the end of the project. During the project implementation period, the contractor shall provide a driver, fuel, and all other vehicle operation and maintenance requirements for each vehicle. The vehicles shall be exclusively used by the employer's staff during contract implementation up to a maximum of 4500 km per month per vehicle. The contractor shall be responsible for registration, insurance, inspection, and any other statutory requirements related to daily operation and maintenance of the vehicles in Kenya until the vehicles are officially handed over to the employer.

12. 1. Vehicle requirements

The contractor shall provide the following vehicles for the duration of the project:

- 2 x Four-Wheel Drive Landcruiser 79 double cabs
- 1 x Four-Wheel Drive Hilux Double Cab

12.2. Vehicle specifications

LAND CRUISER 79 2024 SPECIFICATIONS		
1	Displacement (cc)	4200
2	Engine type	1HZ
3	Fuel Type	Diesel
4	Max Power KW @rpm	96@3800
5	Max torque NM @rpm	285@2200
6	Color	Ivory White
7	Valve Mechanism	12 valve, SOHC
8	Body style	Double Cab
9	Fuel System	Distributor type
10	Tyre Size	7.50R16-8(E)5.50F
11	Transmission	5 Speed manual transmission
12	Wheelbase (mm)	3180
13	Number of seats	5
14	Fuel tank capacity (L)	130
15	Front brake	Ventilated discs
16	Front suspension	Standard, rigid live axle, coil spring
17	Rear Suspension	Standard, rigid axle, leaf spring
18	ABS	Yes
19	Manufacturer Warranty	3 years/100,000 kms
20	To include land cruiser 79 TJM bull bar T15 steel black with fog lights.	
21	To include Land Cruiser 79 Rear Replacement Bar RB8 Swing Away Tire Carrier. Steel Black with Jacking points, combination LED taillights and tow Bracket.	
22	To include land cruiser 79 RMD sump guard steel and Bed Liner Tray.	
23	To include T-Max Electric Outback 15,000 Lbs. Winch (24v).	
24	All other specifications will remain as prescribed by the Manufacturers.	

2024 2.8GD ADVENTURE DOUBLE CAB 6-AT 4X4		
1	Displacement (cc)	2755
2	Engine type	Cylinder in Line
3	Fuel Type	Diesel
4	Max Power HP/rpm	204/3000-3400
5	Max torque NM	500/1600-2800
6	Color	White
7	Valves/Cylinder	4
8	Body style	Pick-Up double cab

9	Number of doors	4 doors
10	Gearbox	Automatic
11	Transmission	Part time manual 4x4
12	Wheelbase (mm)	3085
13	Number of seats	5
14	Fuel tank capacity (L)	80
15	Front brake	Ventilated discs
16	Parking brake	Manual
17	Rear brake	Drums
18	Front suspension	Coil type
19	Rear Suspension	Leaf
20	ABS	Yes
21	Daytime running lights	LED
22	Fog lamps	Front
23	Camera	Rear
24	Cool box	Yes
25	Number of spare wheels	1
26	Airbags	Knees (driver), curtains, side, passenger, driver
27	Manufacturer Warranty	3 years/100,000 kms
28	All other specifications will remain as prescribed by the Manufacturer.	

PART C: TECHNICAL REQUIREMENTS

ELECTRICAL WORKS

1. GENERAL

1.1. General Design Requirements

The plant/equipment shall be designed to ensure continuity of operation under all working conditions at the site as the first consideration and to facilitate inspection, maintenance and repairs. All reasonable precautions shall be taken in the design of equipment and of the works, to ensure the safety of personnel concerned with the operation and maintenance of the works.

The rated frequency of the system is 50 Hz.

The requirements of the **Kenyan Grid Code** shall apply.

Wherever the requirements in this specification are in conflict with any of the requirements in other sections of the contract the specification having the most stringent requirement shall be governing.

Materials and equipment for use should work efficiently and with high level of reliability with special consideration to:

a) Ambient weather conditions
b) Dust storms
c) Fire risk and flooding as a result of fire protection
d) Direct/indirect solar radiation
e) H_2S content in the atmosphere

Outdoor equipment shall be designed so that water cannot collect at any point. The undersides of all tanks shall be ventilated in an approved manner to prevent corrosion.

All kiosks and cubicles shall be fitted with controlled door operated internal illumination lamps and shall be adequately ventilated to prevent condensation.

All kiosks and cubicles shall be fitted with controlled anti-condensation heaters. Anti-condensation heaters shall be designed to operate at 240 V AC. A thermostat shall be provided to monitor the internal temperature of the switchgear or cubicle.

Cast iron shall not be used for the chambers of oil filled apparatus or for any parts subject to mechanical stress.

Mechanisms shall be constructed to prevent sticking due to rust and corrosion, and the bearings of exposed operating shafts shall be designed to prevent moisture seeping along shafts into the equipment's interior.

No welding, plugging or filling of defective parts shall be done without the Engineer's prior sanction in writing.

Corresponding parts of similar equipment, and equipment liable to be renewable, shall be fully interchangeable and the Contractor will be required to demonstrate this feature to the Engineer's satisfaction.

All equipment shall operate without undue vibration and with the least practical amount of noise.

All equipment shall be designed to minimize corona or other electrical discharges.

All electrical equipment shall be type and routine tested in the factories. Type tests will not be repeated if type test certificates of identical or similar ("similar" according to the definition of IEC) equipment and for the same frequency (50 Hz) are available. The type test certificates shall be in English language and shall certify that the type test is according to IEC Standards.

All electrical components shall be adequately rated for their most onerous duty and the specified ambient temperature. When equipment is mounted in panels, cubicles etc. due account shall be taken of any heat generated by the equipment therein and the components shall be appropriately selected, rated or de-rated as necessary to suit the most onerous operating temperatures within the enclosure.

Where electrical equipment is located within a designated hazardous area, it should have a minimum degree of protection against explosion suitable for that area classified as per IEC 60079.

The following kind of labels shall be used:

a) Name and rating for main equipment (motors, transformers, etc.) All labels and markers shall be of stainless-steel plates with engraved black letter and with inscription in English.
b) Name and rating for process and auxiliary equipment. These labels shall be of stainless-steel plates with engraved black letter and with inscription in English for rating and name plates.
c) Inscriptions for indoor cubicles, cabinets, boards and panels. These labels shall be of white hard plastic plates with engraved black letter and with inscription in English.
d) Inscriptions for outdoor cabinets, boards and panels. These labels shall be of stainless-steel plates with engraved black letter and with inscription in English.

1.2. Environmental Considerations

H_2S may be present around the site at concentrations up to 5 ppm. Concentrations above 0.3 ppm are unacceptable for exposed copper conductors, and concentrations down to 0.1 ppm have adverse effect on silver-plated connectors and conductors. Rapid tarnishing of these and other materials occurs in this atmosphere. Consequently:

- Switchgear and electronic equipment shall be located only within air- conditioned rooms or enclosures supplied with air under positive pressure from which the H_2S has been removed.
- The only exceptions to this are the individual items of equipment with only a single function having an IP rating of IP 67 (to IEC 60529) or better, and TEFC electrical motors.
- No equipment including bus-bars, links, terminals, fittings, circuit breakers, contactors, relays, contacts and the like, is to be made in whole or in part of silver, nickel-silver, copper, phosphor bronze, brass or other copper or silver alloy, unless hermetically sealed or tin plated to a minimum thickness of 0.002 mm, or otherwise suitably plated. Cadmium plating shall not be used for any purposes including screws and fastenings.
- All circuit boards shall be effectively conformal coated, e.g. epoxy encapsulated or tinned and lacquered, except over gold-plated areas used as connectors. The lacquer shall be applied to both sides to protect against hydrogen sulfide, humidity and dampness. The lacquer used shall be inert to attack from fungi, bacteria, atmospheric conditions, and sunlight (including UV component), and shall have proven suitable and stable properties for at least 15 years maintenance- free service under the conditions specified.
- Where copper conductors are used, they shall be epoxy heat shrink encapsulated or tinned on exposed sections.
- Except for earth conductors which shall be copper, aluminum cabling is to be used in preference to copper, with bi-metallic cable lugs.
- HV insulators shall be suitable for Very Heavy pollution level according to IEC 60815.

Although some equipment may be in air-conditioned areas, it shall be suitable for operation for sustained periods without air conditioning. Maximum design temperature shall be based on the maximum ambient temperature plus all temperature rises that can occur due to heat gains, flows and dissipations that may affect the installation area.

All enclosures shall comply with the requirements as given in this section.

2. STANDARDS

The design and manufacturer of all electrical equipment shall comply with the latest editions of the IEC Recommendations. Compliance with ANSI/IEEE/NEMA standards will only be accepted in case no applicable IEC standards are available.

In case an IEC Regulation or ANSI/IEEE/NEMA standards does not exist or cover the Scope of Works, National Standards, at least equivalent to German VDE Standards or British (BS) shall be applied. In such a case, the Contractor shall provide the Engineer with two sets (official, complete, unabridged and in the English language) of all relevant standard specifications according to which the equipment is manufactured for approval.

The requirements of the **Kenya Grid Code** shall apply.

For interfaces with Kenya Grid the related standards/requirements shall apply.

In case of conflicting requirements amongst any of the specified standards, the standard having the most stringent requirement shall be governing.

3. VOLTAGE REQUIREMENTS

The requirements stated in the latest edition of the Kenya Electricity Grid Code shall apply.

The following voltage levels are pre-assigned and shall be used in the project:

Voltage	Item	Star point/Neutral treatment
240/415 V + 10%, 50 Hz	standard voltage for power supplies to • small electric motors • lighting and domestic power outlets	Solidly grounded
240 V, ± 10%, 50 Hz	Uninterrupted voltage supplies to DCS components, control actuators etc	Solidly ground ed
24 V DC (20 V to 30 V)	for power supplies to the DCS System and instrumentation	To be defined by Contractor

4. PROTECTION FOR SAFETY

4.1. General

In view of the potential dangers of electrical power, the following measures are required for the protection of life, equipment and materials. Basically, all 'live' parts, i.e. all parts of electrical, operational equipment at an electrical potential above or below earth potential when in operation, and with a rated voltage over 24 V, must be insulated or covered so that they cannot be touched accidentally.

In addition, measures must be taken by the CONTRACTOR to prevent the occurrence or persistence of excessively high contact potentials on conductive parts of electrical operational equipment (frames etc.) brought about by faults in insulation.

For installations up to 1000 V, voltages over 50 V are considered excessive contact voltages. Within enclosed electrical installations, with voltages over 1000 V, the contact potential shall be according to the values given in VDE 0101: Annex C (Touch voltage and body current) and IEC 61936-1.

The following rules and regulations are to be observed in carrying out protective measures and in earthing procedure:

- IEC 60079 and 6036,
- VDE 0101and IEC 61936-1 for installations above 1000 V.

In areas exposed to the hazard of explosion, the protective measures outlined in IEC 60079 and IEC 61241 are to be adhered to in the erection and installation of electrical plants and equipment.

Electrical, chemical, thermal and mechanical influences must not impair the protection afforded against explosion. The high ambient temperatures and the influence of nearby heat sources at the installation point must be taken fully into account.

4.2. Protective Measures for Installations up to 1000 V

Protection against direct contact

All 'live' parts of electrical operational equipment that can be reached by hand must be protected against direct contact either by means of insulation or through constructional design, position or arrangement, or by means of special devices. If, in the case of enclosed switchgear or control cabinets, access is required in the course of normal operation (e.g. for replacing fuses), protection against direct contact must still be ensured when the switchgear or control cabinet has been opened up.

Protective insulation
Protective insulation is to be provided by means of additional insulation over and above the insulation provided for operational purposes. This measure must prevent the occurrence of a dangerous contact potential.

5. ELECTRICAL EQUIPMENT INSTALLATION CONDITIONS

ENCLOSURE CLASSIFICATION

All equipment and materials provided for outdoor installation shall be resistant against the prevailing climatic conditions, sand storm, strong sun radiation and high H_2S content in the air.

Equipment enclosures for electrical equipment shall comply with IEC 60034, IEC 60079, IEC61439, IEC 60529, IEC 60947, and IEC 62271 as applicable.

Unless otherwise specified equipment enclosure classes shall be as follows:

Equipment	Internal location		External location	Below ground
	Dry	Damp		
LV switchboards, distribution boards, local control panels	IP 41[1)] IP 52[2)]	IP 54	IP 65W	- - -
LV motors	IP 54	IP 55	IP 55W	IP 58
LV motor terminal box	IP 54	IP 56	IP 54W	IP 55
Motor operated valve actuators	-	IP 57	IP 57W	IP 57
Lighting – plant	IP 54	IP 55	IP 65W	IP 56
Equipment terminal boxes	IP 55	IP 55	IP 65W	IP 66
Junction boxes; Local Control Panels	IP 55	IP 55	IP 65W	IP 67

The additional measures (e.g. “W”) shall consist of sunshades, protection covers against splashing water, rain water and sand, additional sealing, special acid resistive coating etc., depending upon the particular site conditions.

In instances where enclosures are exposed to the atmosphere they must be protected against ingress of dust and windblown, sand and direct solar radiation.

All enclosures shall be protected against ingress of vermin. Louvered openings shall be backed with fine mechanical wire screens.

The doors of the different cabinets, panels and switchboards shall be equipped with a uniform key lock system, consisting of:

- Door handle with locking bolts, to keep the door in the closed position
- Key system to lock the door

The uniformity of the key-lock system with the various equipment manufacturers will have to be coordinated by the Contractor. The keys shall be sorted in each electrical/equipment room in suitable key boxes, lockable by pad-lock.

6. EARTHING AND POTENTIAL EQUALIZATION SYSTEM

The earthing system and potential equalization shall comply with the following standards:

- IEC 61936-1: Power installations exceeding 1 kV a.c. - Part 1: Common Rules
- DIN EN 50522 Earthing of power installations exceeding 1 kV a.c.
- IEC 61643: Low-voltage Surge Protective Devices

For earthing, protective earthing, functional earthing, potential equalization and lightning protection-potential equalization, a common system shall be established.

No framework parts or other structural components shall be used as earth bar.

All system and plant components which are to be earthed as well as electrical components, like protection and control cubicles, sub-distribution boards, control systems, motors and transformers, shall be connected to the earthing rings/bars.

All steel structures within a welded section shall be connected to the main earthing system.

An earthing cable shall be included in all main cable runs.

Protective earthing and potential equalization of electronics cubicles, frameworks, racks etc. shall be executed as follows:

- Earthing rings shall be installed in the I&C rooms as buses, to be connected at several locations – at least two – to the earthing network.
- For each row of cubicles, at least two connections shall be made to the earthing ring. Cubicles in a row shall all be connected by conductors to each other.
- If cubicles are attached to raised platform flooring of steel structural parts, it shall be ensured that these are electrically connected to each other throughout the area. The raised floor shall be connected to the earthing ring at several locations, and as a minimum at two corners of the room.

7. EMC MEASURES

All EMC measures shall ensure that during subsequent operation, no impermissible malfunctions or damage to equipment occurs due to violating electromagnetic compatibility.

The description of the measures is not limited to this chapter, but also forms a part of other chapters, in particular “Protective measures", "grounding and lightning protection” and “Cabling”.

The EMC requirements are set out in the following paragraphs.

Under consideration of the conditions and constraints, the equipment used shall emit the lowest interference signals and exhibit the highest immunity to interference.

All equipment items shall operate properly when connected to networks with a power supply corresponding to the maximum permissible tolerances as laid down in DIN EN 50160 (as regards, harmonics, voltage fluctuations etc.).

Priority is given to reducing sources of interference.

Additionally, by means of high-quality screening, generation of over- voltages due to inductive or capacitive coupling shall be reduced. Influencing by electrical and magnetic fields shall be lessened.

Earthing and potential equalization systems designed for low-impedance shall reduce generation of over-voltages due to ohmic coupling.

A suppressor circuit shall be provided at all low-voltage main distribution boards.

Overvoltage protection shall be foreseen within the power supply for both central and distributed power supplies to electronic cubicles.

All conductive parts of the structures and installation within the scope of the contract must be connected to the main earthing system.

8. CABLE AND CABLE TRAYS

8.1. Cable Laying and Routing Requirements

The Contractor is responsible for cable routing and laying must observe a strict unit/common service separation. The cables must be routed on different cable channels or, as the minimum requirement, on different cable trays, so that in case of a fire or any accident on a cable channel or tray the unit and the common service will not be affected together.

The instrument measuring and control cables as well as the cables of the Communication Systems must be laid sufficiently apart from the power cables so that no interference will occur, and the transmission of fault signals is excluded.

On vertical cable risers the cables must be secured with corrosion-resistant cable clips (e.g. cable clamps with cable protecting cable sleeves).

Cable risers near gangways or in electrical rooms that are exposed to possible mechanical damage are to be protected by suitable metal cover.
All holes in cubicles made for cable routing must be sealed fire-resistant, when the cables have been laid.

When the cables are no longer supported on cable trays or risers etc. the power, DC and instrument cables must generally be run singly in high-strength plastic conduit. With lighting cables, measuring and control cables, several similar cables can be run in one conduit. Surface-mounted conduits must be secured every 1.5 m.

In general the bending radius during installation shall be within acceptable limits as specified by cable manufacturer.

The laying of cables outside of buildings should be preferably on cable bridges were the cables are to be naturally ventilated.

The cables must be laid at a depth of 0.8 m at least, if it runs inside of the plant area and at a depth of 2 m at least, if it runs outside of the plant area.

The cables shall be buried in a suitable thermally stable bedding material as required for the cable heat dissipation and include a cable warning tape with the inscription “CAUTION BURIED HIGH VOLTAGE CABLE”. The remaining trench may be backfilled and compacted with the available excavations.

The location of each cable marker with the coordinates shall be surveyed and registered in a cable routing map.

When laying the cables on cable trays, cable risers, cable channels, etc. and when choosing the size of the cables care must be taken that sufficient ventilation is available and that there is no possibility of thermal overheating, or strain on the cables.

Cables which must move with connected apparatus owing to thermal expansion or mechanical vibration must be provided in a flexible form or they must have sufficient slack at the location.

All the ends of the cables must be prepared according to the particular requirements of the manufacturers and connected to existing terminal strips, terminal screws, apparatus terminals, etc.

The necessary cable sealing ends and the stripped and fanned-out cable ends, where no sealing ends are provided, must be fixed to the appropriate supporting structures.

8.2. General Cable Construction Requirements

The medium and low voltage cables shall be plastic-insulated copper cables.

The cables must be suitable for laying indoors, in the open (direct or indirect sunlight), in ducts, on trays, in the ground and in water. The cables must be resistant to direct solar radiation, the effect of oil, bacterial action, vermin, insects and rodents. Outer sheaths are to be manufactured from non- combustible or flame retardant material.

All cables must be provided at both ends with identification in the form of numbered labels corresponding to the plant coding system which are clearly visible, captive and unrottable. The individual cores will be numbered or identified by color-coding.

The cables must be laid to ensure they can be replaced or renewed simply.

8.3. Medium Voltage (MV) Power Cables

The design of the MV cables shall be screened, single-core or three-core cables preferably with XLPE insulation. The cable shall be sealed with a red, non-fading PVC outer sheath. Three-core cables shall be designed with individually screened cores.

The cable conductor shall be tinned copper wires, for cables inside the plant boundary or tinned aluminum wires for cable laid outside of the plant boundary.

The MV power cables must be designed for the thermal and short-circuit characteristics of the electrical systems, considering the fault clearing time of the associated protection relay.

Where the cable core screens are inadequate to meet the earth fault current calculated by the Contractor, a metallic layer of adequate cross-sectional area shall be included in the design applied over the screen. The metallic layer shall be constructed of annealed high-conductivity tinned wires.

The cables must be terminated and connected to the indoor metal-clad switchgear or the sealing ends are installed in cable connection hoods mounted on the power transformers.

8.4. Low Voltage (LV) Power Cables

The low voltage power cables shall be standard single and multi-core cables with tinned copper conductor and XLPE insulation.

To ensure the elimination of excessive contact potentials on any object, effective earthing must be carried out as a safety measure and suitable 3- core, 4-core and 5-core low voltage power cables must be provided. The minimum conductor cross-section of the low voltage power cables is 2.5 mm^2. If 3 1/2-core cables are used, the reduced conductor for protective neutral must have a cross-section of at least 16 mm^2. In lighting systems (especially discharge lighting circuits) the use of a reduced conductor for the protective neutral is to be avoided.

Depending on the site conditions the DC cables must be single-core, 2-core or 4-core. Between batteries or rectifiers and the DC switchgear, single-core power cables should in general be used.

The LV power cables must be designed for the dynamic and thermal characteristics of the electrical system and for continuous operation.

8.4.1 Over sheath

The PVC over sheath shall be oil-resistant and treated in order to prevent the cables from spreading fire and shall be black colored for all LV power cables. The sheath shall contain the manufacturer's name, the voltage levels Uo/U in kV and the cable type.

8.5. Current Carrying Capacity and Voltage Drop of Power Cables

The ratings for continuous loading of the cables shall be calculated according to the relevant IEC regulations. The Contractor must submit corresponding tabulations for all cables to be used.

The Contractor shall submit detailed LV & MV cable sizing & ampacity calculations which include but not limited to: cable voltage drop, cable short circuit capability, cable damage curve, etc taking into consideration grouping factor , insulation power factor , load factor , % fill (cable in trays) , motor service factor, temperature rise derating factors , etc. In some locations, the heat generated from the equipment, elevates the ambient temperature, such elevated temperature has to be accounted for.

8.6. Measuring and Control Cables below 60 V

For voltages up to 60 V, measuring and control cables shall have stranded or solid tinned copper conductors of minimum 0.8 mm diameter. Multi-pair control cables with paired lay-up of the leads and lay-up of the pairs themselves shall be used.

Wherever necessary, e.g. for all cables leading outside the relay rooms and/or control rooms, the control cables shall have a common screen (Al- foil or Cu-foil). Cables must generally ha
ve appropriate electrical protection against inductive/resistive influences and lightning.

The required compensating wires for temperature measurements must be at least 1.5 mm^2 tinned copper conductors.

The maximum voltage drop shall not exceed 2%.

The individual cores of the multi-pair control cables shall be identified by numbers or a color coding system.

8.7. Fiber Optic Cables

The optical fiber cable shall be suitable for direct buried applications and each cable shall be sized with 400% over capacity in the number of single mode fibers available on completion of commissioning and shall comply to ITU-T G.652.

The tubes shall be filled with filling compound and stranded, together with fibers, around a resin glass plastic strength member to form a compact and circular core. The cable structure shall be completed by application of a synthetic core wrapping an APL (Aluminum Polyethylene Laminate) inner sheath, an ant rodent, double sheath with corrugated steel tape armor and an outer sheath in polyethylene or HDPE (High Density Polyethylene) with zero halogen or better proven industry application material.

Each single mode optical fiber shall be designed to provide good performance at 1310nm and/ or 1550 nm and the geometric and transmission characteristics shall fully comply with ITU-T recommendations.

The fiber material shall be manufactured with pure silica cladding and doped silica core in order to guarantee optical transmission performance.

The centre of the cable core shall contain a resin glass with a typical diameter of 2.4 mm or better and the diameter shall be defined in accordance with the maximum pulling force.

The secondary coating tubes of the fibers shall be colored for counting of the fibers and counting direction identification in accordance to Manufacturer Standard.

The cable maximum pulling tension and minimum bending radius shall be in accordance with the cable manufacturer's specifications.

The tension of the cable shall be monitored and controlled/limited during pulling. In case of mechanical pulling, the tension limit mechanism/recorder shall be calibrated and proven to the satisfaction of the employer.

The Fiber Optic Cable shall be treated with care. The cable shall not be trampled upon, run over by vehicles, pulled along the ground, over fences, rock or asphalt. The cable shall be carefully inspected and observed prior to, and during pulling work.

On completion of pulling each cable section and before the cable is cut, a check must be made to ensure that there is sufficient cable for racking, testing and splicing. This test/splice allowance shall not include any portion of the cable covered by a cable grip.

All cable at splicing locations and communications offices shall be identified with approved permanent tags.

All fiber optic cables shall be terminated directly to the connector which will be housed on an employer approved fiber distribution panel (Patch Panel).

Appropriate cable splice closures for the type of cables to be spliced shall be provided. The closures shall be approved by the employer; re-enterable, waterproof and externally non-metallic buried splice closures.

Splicing of fiber optic cables shall be done by arc fusion method using a latest model, fusion splicer as approved by the employer, in compliance with clients engineering and construction standards. Where clients standards are unavailable, GTE splicing specifications shall be used as directed by client's representative.

The fusion splicing equipment shall be of the highest mechanical and optical quality to assure uniform, low-loss splices. The splicing equipment shall employ automatic, high-resolution fiber alignment technology; based on pre-splice least-loss criteria established by the machine itself. The splice machine(s) shall have a visual monitor by microscope or miniature CRT/LCD viewing screen, and shall provide a read-out estimate of the splice loss.

The fiber cleaver(s) shall be of the highest quality to assure uniform, clean, 90 degree cleaved fiber ends.

8.8. Cable Supporting Structures

8.8.1 Construction requirements

Basically, pre-fabricated cable trays, cable risers, hanger rods, screws, clamps and all fixing material of corrosion-resistant finish, hot-dip galvanized, shall be used. If in certain sections the use of trays and risers is not possible, cable racks are to be provided in such places. These shall be made of corrosion-resistant, steel angle sections, hot dip galvanized. The steel angles must be cut to size on site and exposed cut surfaces must be suitably treated on the spot to prevent corrosion before being fitted. The minimum requirement for this treatment is the application of an anti-corrosion layer of zinc coating.

All cable tray T-junctions, cross-overs, vertical and other shelving, bends, etc. must consist of pre-fabricated tray elements so that crushing of the cables at these transition points is avoided.

The cables laid on the trays must be carefully arranged and ordered. All cable tray routings consisting of several individual cable trays that are located outside buildings and exposed to the sunlight shall be provided with sun-shades made of the material as described for the cable tray equipment.

For safety reasons the lower parts of the hanger rods and all other exposed parts in manways and escape routes must be fitted with plastic covers.

In all external areas, in not complete closed buildings and in areas with corrosive gas or steam the hot dip galvanized material used shall be provided with an additional coating according to DIN EN ISO 12944ff.

The cable trays must be designed to ensure that there is 15 % spare space on all trays when commissioning and handing-over is complete. The fixing materials for the cable trays and risers must be corrosion- resistant or at least be hot-dip galvanized. The rods, brackets and risers must be fitted with appropriate support brackets to be fixed to anchor rails or fixed by dowels and screws in walls and ceilings.

Welding to steel structures and the welding together of hot-dip galvanized cable-laying accessories is not permitted.

After completion of the cable-laying work the maximum deflection of the cable trays shall not exceed 2.5 mm per 1.5 m (specified distance between two hanger rods).

In exceptional cases, when the prescribed support spacing cannot be complied with, wide-span cable trays are to be used. In this case the following maximum deflection shall not be exceeded on completion of the cable laying work:

Fixing distance mm	max. permissible deflection m
3	3
4	5
5	8
6	11

8.9. Identification of Wires

The wiring and cores of internal wiring in switchgear, control panels and desks, relay panels, marshalling kiosks and the like shall be identified in accordance with the associated connection/wiring diagrams.

Both ends of every wire shall be fitted with interlocking ring-type ferrules of white insulating material, and engraved in black. The identification numbering system used for the ferrules shall be to the approval of the Engineer.

Where a wire of a multicore cable passes from one piece of equipment to another, e.g. from a circuit breaker to a remote control panel, the Contractor shall ensure that the identity of the wire is apparent at both ends by the use of functional local dependent ferruling.

Each core of multi-pair wiring shall be identified by color and terminal block identification together with an identification tracer per bundle.

Permanent identification of all terminals, wires and terminal blocks shall be provided.

9. TERMINAL BOXES AND TERMINAL CABINETS

In order to minimize the amount of cables and distribution of signals and to centralize connections in the plant, terminal boxes or, wherever necessary, by larger amounts of terminals, terminal cabinets shall be fitted on all the necessary

- Cable crossover terminal points
- Central collecting points for individual analog and binary signals and local transmitters
- Central distribution points for local signals.

Terminal boxes and cabinets must at least have class of protection IP 54 and must be equipped with the necessary terminal strips, cable glands and fittings components for the connection of the cables.

The necessary earthing terminals are to be provided for the boxes and cabinets.

In any area subject to the danger of explosion, the necessary explosion- protected terminal boxes and cabinets are to be provided in accordance with IEC 60079ff.

10. DIAGRAMMATIC SYMBOLS

Diagrammatic symbols complying with IEC 60027, IEC 60034 and IEC 60617 are to be used for setting out the circuit and terminal layout.

11. COLOR CODE SYSTEM FOR CONTROL AND SIGNALING

RAL 7032, pebble-grey shall be applied for all electrical and instrumentation equipment housings.

Color code for indications on control cubicles, panels, desks, etc.

The following will be applied:

- Valve open position green
- Valve closed position white
- Alarm signal, trip signal, faults red

12. MANUFACTURER'S TESTING

All equipment shall be tested at the manufacturer's works in accordance with the equipment supply standards.

13. SCOPE OF ELECTRICAL WORKS

The contractor will implement the works as described above with reference to the existing single line diagrams. The contractor will adhere to acceptable international standards and practices in the installation of the electrical systems described herein. Specifically, the contractor's scope will be;

a. Estimate the quantity of electrical materials and works described above
b. Provide a cost in the tender prices
c. Procure the materials and implement the installation works as described and in accordance with international standards
d. Test and commission the system
e. Provide the relevant product documentation as supplied by the manufacturers

PART D: TECHNICAL REQUIREMENTS
INSTRUMENTATION AND CONTROL SYSTEM

1. GENERAL

This Part of the specification covers the general requirements for instrumentation and control equipment for the Steamfield

In addition to the requirements of this Part all equipment offered to meet the requirements of instrumentation and control shall also comply where appropriate with other general technical requirements of this specification.

This specification does not however relieve the Contractor of his responsibility for the basic design and execution of the instrumentation and control system as per scope of supply in relevant chapters of this specification. The rules of good engineering practice and the relevant approved standards and regulations shall be observed.

A consistent control and instrumentation philosophy shall apply throughout the plant and shall be implemented in terms of a range of equipment exhibiting a minimum diversity of type and manufacture. The objective shall be to standardize all measurement and control equipment throughout the plant in order to rationalize operation, maintenance and reduce spares holding.

Generally equipment shall be supplied from one composite range of measurement and control equipment as marked by a reputable manufacturer of international standing and shall have a minimum of three years of operational use on similar projects. Details of similar equipment and installations shall be provided. Where particular equipment is not included in the standard range of product of the manufacturer thus necessitating diversity of supply. This equipment shall be identified by the Contractor for approval.

The equipment shall be of modern compact design incorporating the latest developments in proven technology.

Real time indication, recording, logging and integration facilities shall be provided for all those parameters whose trends are considered necessary for safe and efficient operation of the plant and measurement of plant performance. In formulating his proposals the Contractor shall include all variables specifically required for safe start up and shut down to comply with the operational philosophy as given in particular technical requirements.

The Contractor shall list all instruments, alarm and indication initiating devices, instrument transformers etc. he proposes to supply to ensure the safe and efficient operation of the plant. He shall state the supplier he proposes for the instrumentation.
Except where specified otherwise, the design, installation and testing of the instrumentation, control and ancillary systems shall be fully in accordance with BS 6739, ISA, NEMA, IEEE standards or an equivalent standard to the Engineer's approval.

Analogue signals shall be standardized at 4-20 mA in the field.

Direct current plant status and alarm signals shall be standardized on a DC voltage level between 0and 10 volts.

Pneumatic transmission and control signals where offered, shall be of the 0.2 to 1.0 bar (3-15 psi) standard range.

Measurement and control instrumentation shall have high electromagnetic and radio frequency interference immunity and shall not be affected by mobile phone to portable radio transmitters operated in the vicinity of the equipment. Open door cubicles have to be immune to EMC influences (relevant EMC standards). Any limitations shall be stated.

All the equipment shall be suitable for the location in which it is to be mounted and in particular all outdoor equipment shall be suitable for the prevailing climatic conditions.

The appropriate class for items of control and instrumentation shall be determined from the specified or intended location and the intended class shall be stated. Instruments and devices located in hazardous areas shall be of suitable explosion proof type and intrinsically safe type.

All instruments whether for local indication or remote transmission shall be of good quality and shall have an accuracy and repeatability appropriate to their duty.

The accuracy and repeatability of each instrument offered shall be stated and be certified when supplied, by means of supporting documentation such as calibration sheets, testing certification and data sheets.

All electronic devices shall be protected against transient voltage levels/short circuits which would otherwise damage the device.

The ranges of all instruments shall be arranged, where practicable, so that normal working indication is at approximately 60% of full scale deflection with the exception of devices based on a square root relationship which shall normally work at 75%.

Measurement and control instruments shall be matched to the main plant equipment ratings in all aspects. Instrument ranges, installation codes of practice and precautionary measures for the safety of the Plant and the operation & maintenance personnel shall be observed.

Each field mounted instrument or device shall be properly labelled/ tagged as detailed in the general technical requirements. All instruments shall be identified by appropriate tag numbers; permanent non-perishable nameplates attached to each instrument shall be used for this purpose.

Further, every such instrument or device incorporating an indicator shall also be labelled with its duty description.

Each transducer shall have its own tapping point and sensor (except where this is physically impossible which shall then be assessed and approved by the Engineer). In particular all transmitters to be used for protection and control shall have their own separate tapping points.

All type of instrument devices, such as indicator, switches, transmitters, etc. shall be installed in such a manner as to facilitate easy removal of the device without causing shutdown of the process, if not related to safety measures of plant.

All instruments shall be installed and connected so that on-site calibration using portable test equipment is possible,

without removal of the instrument from the process line.

2. REFERENCES AND STANDARDS

The works for instrumentation, control and supervisory systems will have to be designed, manufactured and tested according to the relevant codes, standards, rules, and regulations as listed below, all in latest valid edition.

In case any inconsistency or conflict between the different specifications, codes, forms or drawings and standards, the more restrictive shall be applied. The inconsistency shall be brought to the attention of the Employer for resolution. Information regarding inconsistencies not brought to Employer's attention could result in the rejection of the proposal.

- IEC 60079 Electrical apparatus for explosive gas atmospheres Part 11: Equipment protection by intrinsic safety "i"
- IEC 60255-151 class-II for over voltage
- IEC 60529 Specification for degrees of protection provided by enclosures. IEC 60584-1 Thermocouples – reference tables
- IEC 60751 Industrial platinum resistance thermometer sensors
- IEC 61131 Programmable controllers
- IEC 61508 safety integrity level (SIL)
- ISO 5167 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full
  - Part 1: General principles and requirements
  - Part 2: orifice plates
  - Part 3: nozzles and venturi nozzles.
  - Part 4: venturi tubes
- EN 837-1 Bourdon type pressure and vacuum gauges. EN55011 for noise disturbance
- BS 1041 Code for temperature measurement.
- BS 6739 Code of Practice for instrumentation in Process Control Systems: installation, design and practice.

3. INSTRUMENTS

3.1. General

Instruments shall have the following characteristics:

- be rated at IP 65 in accordance with IEC 60529;
- be suitable for use in a geothermal environment;
- Transmitters to be Fieldbus compliant.
- All instrumentation shall be HART capable, with Cluster PLC IO modules Hart compatible. All instrument HART configuration shall be available from the DCS at the power station.

3.2. Materials of Construction

Materials used for the construction of all instruments shall be selected for their suitability for continuous operation in the corrosive atmosphere of geothermal Steamfield in a tropical environment.

Materials shall be selected so as to preclude the occurrence of galvanic or any other type of corrosion.

All components in contact with the process fluid and exposed to environment shall be 316 Stainless Steel unless otherwise specified.

3.3. Field Devices Mounting Arrangements

The contractor shall provide all mounting hardware such as bolts, brackets, nuts and washers for all devices to be installed.

The mounting arrangement shall be as per the Contractor's standard but subject to the following general requirements:

- The mounting arrangement shall be rigid and vibration free.
- All components used (posts, brackets, fixings) shall be corrosion Protected.
- All indicating instruments shall be mounted such that the display is in an accessible location.

The Contractor shall provide details of the instrument installation standards as part of the Employer's design review. Any non-standard mounting arrangements shall be subject to Employer's review and agreement.

3.4. Electrical/Pneumatic Characteristics

All analogue measurements from the process equipment that are being utilised for remote indication and control purposes shall be transmitted as a standard 4-20 mA dc output signal, unless otherwise accepted by the Owner's Representative.

Transmitters and transducers shall be solid state electronic devices suitably designed for the location and services required.

Unless specifically agreed otherwise all transmitters shall be "SMART" and be compatible with the HART protocol. All configuration parameters shall be stored in non-volatile memory.

The Contractor shall take precautions to minimise the risk of damage to the instruments and transmitters associated with electrical surges induced by lightning and or other electrical disturbances. Surge protection shall be fitted on any instrument where the risk of damage cannot be mitigated by other specific measures.

Electronic transmitters shall not mal-operate in the presence of electromagnetic or radio interference.

Electrical switch contacts shall be rated so that the minimum, switching and current carrying rating is appropriate for the required duty cycle. Unless specified otherwise switch contacts shall be DPDT rated at 10 A, 220 V AC and 5 A 24 VDC.

All wiring shall be of tinned copper throughout and not just at termination points. All termination assemblies shall be weather-proof suitable for outdoor mounting in the environment specified. Terminations, lugs and similar exposed or likely to be exposed to the environment shall be tin- plated.

Cable entry to a field mounted devices and instruments shall be via stainless steel cable glands having a minimum rating of IP66.

3.5. Enclosures

All outdoor enclosures containing circuits with nominal voltages up to 1,000 Vac and 1,500 Vdc shall be manufactured from stainless steel and rated to IP66 to prevent the equipment performance being affected by the ingress of dust or moisture.

3.6. Instrument Junction Box

The instrument junction boxes shall be of gauge 14 316L stainless steel constructions seams continuously welded and ground smooth, with no holes or knockouts. The instrument junction box shall have seamless foam-in- place gasket for watertight and dust-tight seal. The junction boxes shall have a rolled-up lip around the three sides of the door and all sides of the box opening to exclude liquids and contaminants. All junction boxes shall have minimum environmental rating of NEMA 4X.

Screws and clamps of the junction boxes shall be of stainless steel construction. The door of the junction boxes shall only be removable by pulling the stainless steel hinge pin. All junction boxes shall have stainless steel hasp and staple for padlocking. The junction box shall be provided with external lugs with 8-mm diameter holes for box mounting.

The junction boxes shall have stainless steel panel for mounting of mega blocks, terminators, etc. The junction

boxes shall have weldnuts for mounting of the panel and terminal block kits.

All junction boxes shall have a high-impact thermoplastic data pocket. All field junction boxes shall be electro-polish finished.

3.7. Device Identification Tags

All devices shall be supplied with permanently attached, stainless steel, identification tag showing:

- the device tag number
- The Manufacturer's name, model and serial numbers indelibly etched or stamped on to the tag.

Devices to be mounted in panels shall have their identification tag attached to the back plate, or the part of the instrument that will be visible from inside the panel.

Devices not mounted in panels shall have the tags attached by stainless steel wire.

3.8. Device Data Sheets

Data sheets to ISA Standards and containing detailed requirements of specific devices are to be provided in the tender.

3.9. Transmitters

3.9.1 General

All transmitters shall have the following general characteristics:

- SMART transmitters compatible with the HART protocol
- 24V DC loop powered
- 4 - 20 mA Output Multivariable transmitters shall only be used with Employer's agreement. Accuracy shall be 0.25%, or better, of calibrated span. This includes the combined effects of linearity, hysteresis and repeatability. The stability shall be equal or better than ± 0.25% of upper range limit, for 12 months.
  Generally, transmitters shall have local indication using an LCD display with all units in SI

3.9.2 Differential Pressure Transmitters

Differential transmitters shall be "smart" transmitters and be compatible with the HART protocol. The differential pressure transmitters shall be of the force balance diaphragm type.

The differential pressure transmitters shall be able to withstand a differential pressure equal to the full line pressure without affecting calibration.

An integrally mounted 316 stainless steel 3-valves or 5-valve manifold shall be supplied with each differential pressure transmitter.

3.9.3 Pressure Transmitters

Pressure transmitters shall be "smart" transmitters and be compatible with the HART protocol. The gage pressure transmitters shall be of the force balance diaphragm type.

The gage pressure transmitters shall be able to withstand the full line pressure without affecting calibration.

Process connection of the gage pressure transmitter shall be ½" FNPT.

3.10 Temperature Measurement

Temperature measuring primary elements for distant reading shall be resistance thermometers or thermocouples. The preferred types are as follows:

- BS 1904: platinum resistance thermometer elements
- BS 4937 Part 4: chrome/alumel thermocouples (type K)

If temperature transmitters are used they shall be “smart” transmitters and be compatible with the HART protocol.

3.11 Instrument Tubing & Fittings

All process connected instrument tubing shall be ½” OD and 0.049” wall thickness. It shall be seamless, 316 stainless steel, to ASTM A269. Tube lengths shall be a nominal 6m. Tube fittings and couplings shall be Swagelok or accepted equivalent. All fittings shall have NPT threads, unless otherwise stated, and be supplied in 316 stainless steel.

Pipework and tubing shall be neatly run and suitably supported in a manner such that no pockets or traps can occur. If either is unavoidable then the Contractor shall provide a suitable drain or vent valve that shall be easily accessible from a floor, permanent platform or walkway. Instrument piping used on liquid services shall be self-venting to the main, while gas and vapour instrument lines shall be self-draining to the main.

Movement of the elements of the Works, where applicable, must be taken into account to avoid damage to the piping and/or connected instrument. Siphon condenser seals or pigtails shall be mounted adjacent to steam pressure instruments to protect the primary element, if necessary. For steam and gas piping all impulse lines shall have a continuous fall back to the pipe. For water and liquid piping there shall be a continuous fall towards the instrument. Where these conditions cannot be met vents shall be included in high points and drains in low points of the pipework.

All connecting lines between tapping points and instruments, transmitters or test points shall have not less than two isolating valves. One isolating valve shall be located at the tapping point and one isolating valve located as near as practicable to the instrument, transmitter or test point. For tapping point valves (at the pipe work) flanged valves are preferred. For pressures greater than 20 bar, two valves shall be located at the tapping point. Tapping point valves shall preferably be ball valves.

The instrument valve located at the instrument, transmitter or test point may form part of an accepted type of instrument valve manifold, and be associated with any necessary vent, test and equalising valves.

Blow-down vent and drain valves are required in the connecting lines and instrument manifolds to all sight glasses, transmitters and instruments. Test valves are required adjacent to all instruments.

All instrument valves shall be located for easy access by maintenance personnel from a floor, permanent platform or walkway.
Isolating valves shall be capable of being locked in the fully open or fully closed position. Each test point valve shall be fitted with a screwed removable plug in the outlet.

All tapping point isolating and blow-down valves shall be supplied by the Contractor with accepted valve labels in permanent materials. The label inscription shall consist of the instrument reference, tag number and valve service (primary isolation, blow-down, etc.) See section 2.3.

All tapping points shall:

- include a port to enable “rodding out”
- include a connection to be able to fill the lines with antifreeze

Instrument air signal tubing and air supply connection tubing for pneumatics shall be 3/8” OD and 3000# seamless 316 stainless steel to ASTM A269 unless specified otherwise.

3.12 Measurement Ranges

Wellhead pressures: 0 to 100 bar
Line pressures: 0 to 30 bar
Temperature: 0 - 250 ˚C
Flow: 0 to 400 tons/hour

4. CONTROL CABLES

Control cables shall have tinned copper conductors with PVC insulation rated for 600 V and PVC overall jacket unless otherwise specified. Instrument cable, single and multiple pairs, shall have an overall shield.

Multiple pairs shall also have each pair shielded. The shields shall consist of an aluminium/mylar tape with a tinned copper drain wire. Braided copper is not allowed for the shields.

Boot lace ferrules shall be used for conductor connections to conventional terminal blocks, unless the terminal is specifically designed for another arrangement.
The Contractor shall not use copper sheathed cables.

5. CABINETS

Unless otherwise stated all apparatus shall be accommodated in cubicles.
Special attention shall be taken to ensure that heavy apparatus i.e. power supplies, shall be suitably supported. All the apparatus of solid state type shall be mounted on plug-in cards in cubicles. Similar racks or cubicles shall, as far as possible, be employed for all apparatus.

Cabinets shall be of fabricated steel construction of minimum thickness 2 mm, galvanized, dustproof, vermin proof to IP54 and so designed that condensation shall not affect the insulation of the terminal blocks or cables.

Sufficient space shall be included in the cubicle for terminals and cable trunking. The trunking shall not be overfilled and adequate space shall be allowed for easy removal of lower cables. All spare cables shall be contained in the trunking.

Cabinets shall be complete with all necessary terminal blocks, wiring, washers or tags, wiring ferrules, labels and door locks. All cabinets shall accept a common key for locking.

In each cabinet circuits shall be grouped and labelled according to function (i.e. system control, alarm and tripping circuits, telephone circuits, etc.), with the labels attached to the fixed portion of the terminal boards. Terminals shall be provided for connecting the screens of screened twisted pair cables or the overall screen on multicore cables and shall be adjacent to the termination of the associated twisted pair.

The lowest mounting point, plug-in group or terminal block shall be not less than 300 mm above floor level.

Racks and cubicles shall be complete with all necessary tag blocks, terminal blocks, cable glands and gland plates for small wiring and multicore cables, and earth bar with earthing connection. These items shall be located in an approved, easily accessible, position and so arranged that the terminals face the access direction for convenience during maintenance. Terminals shall be provided for connecting the screens of screened twisted pair cables or the overall screen on multicore cables.

Cubicle doors shall be provided with lift-off type hinges and arranged to lie flat back and not restrict access to the panel. They shall be secured by handles with integral locking, and they shall be sealed with a gasket of rubber or other accepted material.

A panel heater of accepted type shall be fitted in each cubicle, thermostatically controlled and with an on/off switch.

The interior of the cubicles shall be painted white or some other approved colour and a lamp shall be fitted inside each cubicle and so arranged that the wiring is illuminated as evenly as possible without dazzle. The exterior shall be finished in an approved colour preferably of light tone in keeping with the powerhouse aesthetics.

The cubicles shall be complete with all necessary internal wiring, resistances, cable boxes and gland plates, terminal boards, fixings, four cornered panel key plus locking facility, screens and accessories.

Labels shall be provided on the front and back of the panels and the outside of cubicle doors to identify them. All components, cables and control panel wiring shall be labelled to the acceptance of the Employer, and details recorded on as-built drawings.

6. PLC SYSTEMS

The Programmable Logic Controllers (PLC) shall be in compliance with the IEC 61131 standard (the term PLC herein

being equivalent to the term PC (Programmable Controller) in the IEC 61131 standard).

The following IEC 61131 standard severity classes shall apply:

- Voltage drops and interruptions (for DC supply) PS2.
- Operating ambient temperature humidity RH-2.
- Electrostatic discharge service conditions ESD-4.

All the tests defined in the IEC 61131-2 standard shall apply and test certificates shall be provided as evidence of compliance.

It shall be possible to replace faulty modules on-line while the power supply is switched on without causing any further damage (hot swappable). It shall be possible to add and use an additional module while the controller is on- line. The modules shall be "keyed" so only the same type of module can replace a module that is removed.

Non-volatile flash memory shall be used to store the application program and configuration. Any Battery backed up RAM shall have a retention time of a minimum of 40 days.

The field wiring shall be terminated in separate rail mounted screw terminal blocks for each cable, and interconnected to the processor I/O with internal panel wiring.

Additional I/O points shall be easily obtained by plugging in additional I/O boards in slots or bases provided.

Each I/O point shall be furnished with:

a) Protective network, such as optical coupling and/or other isolating barriers.
b) Filter for noise rejection.
c) Test points and fault indication lamps.
d) Fuse protection and fuse failure detection (for inputs only, grouped fuse protection for a maximum number of 8 digital inputs or 8 digital outputs shall be accepted). Individual fuses shall be used for analog inputs and outputs
e) Modules shall monitor their own operational status and any internal error or anomalous condition shall raise an alarm.

A specialized module shall be provided to take its inputs directly from resistance temperature detectors (RTD) embedded within field equipment and to calculate the local temperature of the equipment. RTD inputs shall support 3-wire connections from 100 ohm platinum RTDs.

The PLC shall support communications with the higher level system (HMI layer) via 100BaseTX (IEEE 802.3) or Gigabit Ethernet LAN.

The PLC shall have ethernet ports to connect to IEDs. The protocols supported shall include DNP3 and Modbus/TCP.

Programming and debugging utility software, for the PLC and all Contractor supplied third party devices, shall be supplied with the PLC and this shall be installed on the main and portable engineering workstation computers.

The system shall meet the following criteria:

a) It shall be possible to connect and disconnect the programming and debugging system while the PLC is online.
b) It shall allow on-line modification of the application program.

6.1. Configuration Software, Licences, and Software Utilities

All configuration software for the PLC system, or any monitoring, calibration or adjustment software for any field instruments shall be provided. Where licenses are required for software this shall be taken out in the name of the Principle. All software shall be delivered as CD copies complete with installation software.

6.2. Electronic Equipment Assemblies

Modules and parts of all solid-state equipment shall be built up from proven modules and components. Unproven equipment will not be accepted and the Contractor shall include details of the history of the solid-state control equipment offered. In particular, they should include information on the type of system, the unit size, the in-service date and the extent of automation employed.

All components shall be conservatively rated. The surface temperature of any component shall be at least 5 degrees C lower than maximum test operating temperature of the equipment.

The printed circuit (PC) cards shall be withdrawable plug-in modules mounted on standard width racks, which when mounted in racks or cubicles shall give full clear front and rear access to the cards and their connectors.

All printed circuit (PC) cards and any other electronic assemblies shall have a conformal coating suitable to the environment.

Where it is necessary to mount equipment at the rear of card frames, the mounting shall be arranged on hinges to facilitate access to the card frames and wiring.

Withdrawable cards, modules and cable plugs shall be key coded or otherwise marked to ensure there is no possibility of replacement in the wrong position.

Card frames shall be equipped with locking devices to prevent the unplugging of boards due to vibration or accidental disturbances.

Joints in cubicle internal wiring and in wiring between cubicles will not be permitted.
The following information shall be supplied, prior to installation, for each component used:

a) Name of manufacturer/distributor.
b) Data sheet giving the complete specification for the component.

6.3. Sequence of Events

All wired digital inputs, including remote IO, shall be capable of being designated as Sequence-of-Events points. All Sequence-of-Events inputs shall be capable of resolving and time-stamping the transition of each digital input to within ±5mSec.

6.4. Power Supplies

The PLC system shall be powered from a 24VDC system.
The controllers themselves, I/O modules and control network equipment shall be powered by dual redundant 24V DC power supplies backed up by sealed lead acid batteries. The chargers for the batteries shall communicate status, alarms and voltage measurements via the communication link to the SCADA system.

Essential common DC supplies shall be powered from diode combined supplies with the diode combination being at the lowest control supply voltage.

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Essential common DC supplies shall be powered from diode combined supplies with the diode combination being at the lowest control supply voltage.

6.5. Control System Philosophy

The existing control system for the operating steam gathering system in Menengai consists of an Allen Bradley logix 5575 PLC with studio 5000 rockwell automation software.
The requirement is that the instrumentation and control under this contract shall be interfaced to the existing system, shall be operated through an existing remote system at GDC control room. The control system supplied under this contract shall

have an operator interface, alarm indication for the newly connected wells and local and remote field instrument measurement. Additionally, the contractor will be required to interface the GDC SCADA system to two Independent Power Producers (IPPs) control system to enable the exchange and display of data signals between the parties.
The control system shall allow for data exchange to and from the field system so that the operator has access to field instruments data and control, measured variables, status, alarms and sequence of events.

6.6. Operating Logic

The operating logic for the well controls shall reside in PLCs (Programmable Logic Controllers) associated with the steam field instruments data, with the remote system acting as the SCADA (Supervisory Control and Data Acquisition) interface to the operating logic and measurement information.

6.7. Control Design

The Contractor shall integrate and commission an integrated control system to provide the complete functional operation of the new production wells. The control system shall include, but not limited to;

a) Panel mounted programmable logic controller (PLC) based systems to execute all the process protection, emergency shutdown and any tripping logic, alarm generation, and outputs to the controlled devices for the wells and separator station,
b) Remote I/O or data communications to actuators mounted in the separator station,
c) Combined AC distribution switchboard and PLC cubicle as required,
d) All instrumentation, including at least the instruments contained on the P&ID's, to allow full monitoring of all parameters required for monitoring/control and auxiliaries,
e) Data communications to actuators or intelligent instrumentation as required,
f) A control system network for data communication between devices, fully redundant and monitored for loss of redundancy,
g) All the necessary hardware (including routers, gateways, switches etc.) to allow communication to the operator interface and
h) Hardwired tripping systems specifically required for protection separate to the PLC. The PLC shall fully monitor the integrity of all hardwired systems.

A complete schematic design shall be provided for the PLC cubicle and AC switchboard. The design shall include allocation of AC and DC supplies, terminals, fuses, MCBs, relays, module numbers, rack numbers, slot numbers, channel numbers, module connections and any other related details. The Contractor shall provide a complete electrical design for all of the works provided. This shall include;

a) All schematics and wiring drawings,
b) Connection drawings,
c) General equipment arrangement drawings and plant location drawings,
d) Earthing and lightning drawings,
e) All operational and maintenance manuals,
f) All technical data sheets and
g) Parts list including brand and part number of all hardware.

The drawings shall be a comprehensive set, fully cross referenced and complete with all data on the supplied items and full details on the connection to each item.

6.8. Field Mounted Panel

The PLCs and the AC/DC Distribution systems and any ancillary equipment are mounted in self-contained field mounted weatherproof panels. The field mounted AC Distribution Panel and the PLC panels currently have;

a) A totally enclosed IPS65 stainless steel free standing panels mounted on a plinth, inclusive of internal lighting, a single phase 230V power point, heat shield, with front opening lockable doors complete with 3 point securing locks,
b) An incoming main breaker and power monitor,
c) A change over switch and provision for connection of an external power supply,
d) An AC distribution system complete with barriers to eliminate any human contact to live parts,
e) A PLC system complete with processor, I/O, terminals, communication cards,
f) A 24VDC power supply and applicable charger complete with 24VDC under voltage alarm. Anti-condensation heaters with thermostat control and
g) A drawing sleeve on inside door

6.9. Conformal Coating

All electronic components shall have an approved conformal coating suitable for the geothermal environment.

6.10. Field Junction Boxes

Where required for connection of multiple field instruments and the like the contractor shall provide local field mounted junction boxes. These shall be IP65 rated and constructed of stainless steel, with a single or double lockable door. All field junction boxes shall be mounted at a height to allow easy maintenance access.

6.11. Control Architecture Documentation

The Contractor shall produce and submit for review at least the following for the completed design;

a) Control Architecture diagrams showing the total arrangement of the control system,
b) IT, network and communications system diagrams inclusive of data stream identification, and IP addresses and
c) Control Logic Drawings derived from the functional specification.

6.12. Instrumentation and Control Valves

The Contractor shall supply, install, calibrate, test and commission all field instrumentation and valving and allow for the design and installation within the field control panel of any required interface equipment, power supply and distribution.

6.13. Test Equipment

The Contractor shall provide the following test equipment for the PLC and instrument system and hand over at the completion of the works;

a) One rugged laptop PC complete with the modified PLC and SCADA programs and software, and all calibration software and drivers for all software adjusted instrumentation
b) One set of hart device communicator

6.14. Dry Commissioning

The above systems and facilities shall be commissioned and in service prior to the commencement of Wet Commissioning:
The Contractor shall develop a Dry Commissioning plan.
The dry commissioning shall include:

a) Livening of the control systems via the permanent power system,
b) Establishment of communication system between the PLC's and the operators interface,
c) Point to point proving of the memory locations of the PLC to the operator interface and
d) Provide PLC functional performance tests on site.

6.15. Wet Commissioning

Wet Commissioning and the associated Tests on Completion shall consist of all tests with the actual fluid control to progressively prove the correct operation, output and efficiency of complete steam reticulation system.
Tests on Completion shall demonstrate fitness prior to the Reliability Run and commercial operation by the Employer. Tests on Completion shall be conducted on all equipment, systems and facilities provided for the Works and shall comprehensively demonstrate correct, reliable and safe operation in accordance with the requirements of the Contract.

Following the pre-requisite commissioning tests the Contractor shall carry out Tests to demonstrate any Guaranteed Performance Levels. Details of the proposed Tests on Completion shall be submitted to the Employer for review and comment, as described in the Design Program.

Tests on Completion shall include;

a) The tests required by the applicable standards,
b) The relevant inspection and tests as specified in the Contract,
c) PLC site acceptance tests (SAT), including appropriate capacity, stability, performance, reliability and availability tests,
d) Communications systems SAT, including capacity, stability, performance, reliability and availability tests,
e) Performance Tests and
f) Such other inspection and tests as may be necessary to demonstrate compliance with the Contract.

6.16. LAPTOPS

The contractor will supply 5 field laptops with the following specifications.

PROCESSOR	10th Generation Intel® Xeon® W-0885M vPro™ with Intel® UHD Graphics (2.4 GHz base frequency, up to 5.3 GHz with Intel® Turbo Boost Technology, 16MB cache, 8 cores)	MANDATORY
Chipset	Mobile Intel® WM 490	MANDATORY
Integrated Graphics	Intel® UHD Graphics	MANDATORY
Graphic card	NVIDIA® Quadro® T2000 with Max-Q Design (4 GB GDDR6 dedicated)	MANDATORY
DISPLAY	Next Gen HP Dream Color display 15.6" diagonal UHD IPS HDR 400 eDP1.4 + PSR2 anti-glare BV LED-backlit and ambient light sensor 600 nits 100% DCI-P3 (3840 x 2160)	MANDATORY
OPERATING SYSTEM	Windows 10 Pro for Workstations 64 bit for business	MANDATORY
STORAGE AND DRIVES*	1TB PCIe NV Me TLC M.22280 Solid State Drive **External USB DVD-RW drive**	MANDATORY
DRIVE CONTROLLERS	PCIe Gen 3 x 4 lanes NVMe Solid State Drive	MANDATORY
MEMORY	16 GB DDR4-2667 ECC SDRAM Supports Dual Channel Memory1 Slots are customer accessible / upgradeable	MANDATORY
NETWORKING/COMMUNICATIONS	LAN Integrated Intel® I219-LM GbE, vPro® Integrated Intel® I219-V GbE, non-vPro WLAN Intel® Wi-Fi 6AX201 (2x2) and Bluetooth® 5 combo, vPro® Intel® Wi-Fi 6 AX201 (2x2) and Bluetooth® 5 combo, non-vPro	MANDATORY
AUDIO/MULTIMEDIA	Audio by Bang & Olufsen, dual stereo speakers, World Facing Microphone dual array digital microphone1, functions keys for volume up and down, combo microphone/headphone jack, HD audio	MANDATORY
Camera	720p HD camera; 720p HD IR camera	MANDATORY
KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS	**Keyboard**: Premium Quiet Keyboard, full-size, spill-resistant, backlit, a Programmable Key, with sperate numeric keypad, DuraKey, touchpad with glass surface, multi-touch gestures and taps enabled **Pointing Devices:** Dual point stick; Touchpad with multi-touch gestures enabled, taps enabled as default; Precision Touchpad Default Gestures Support	MANDATORY

SOFTWARE AND SECURITY	Workstation ISV Certifications Performance Advisor Security Management Absolute persistence module Absolute persistence module 6 Device Access Manager Fingerprint Sensor Manageability Integration Kit Gen411 Power On Authentication Security lock slot12 Trusted Platform Module TPM 2.0 Embedded Security Chip with Windows 10 (Common Criteria EAL4+ Certified)(FIPS 140-2 Level 2 Certified) Master Boot, Record security Pre-boot authentication Windows Defender10 Client Security Manager Gen57, 16 BIOSphere Gen6 5 Sure Recover Gen3 Sure Start Gen6 5, 14 Secure Erase 15 HP Sure Sense17, Secure Platform18 Sure Click, Sure Run Gen3 Tamper Lock, Sure View Reflect Smartcard Reader - Alcor AU9560 (FIPS 201 Compliant)	MANDATORY
POWER & BATTERY	Long Life 8-cell, 94 Wh Li-ion polymer2 Up to 16 hours 15 minutes, 150 W Slim Smart external AC power adapter, 150 W power adapter is configurable with NVIDIA Quadro T1000 and T2000 configurations	MANDATORY
WEIGHTS & DIMENSIONS	Dimensions (w x d x h): 14.06 x 9.55 x 1.02 in; 35.7 x 24.25 x 2.59 cm Weights: Starting at 5.32 lb; Starting at 2.42 kg	MANDATORY
PORTS/SLOTS	1 smart card reader 1 SD 4.0 Media Card Reader Left side 61 RJ-45 1 USB 3.1 Gen 1 (charging) 1 USB 3.1 Gen 1 1 headphone/microphone combo Right side6 1 power connector 2 USB Type-C® (Thunderbolt™ 3, pass through support Display Port™ 1.42 , USB 3.1 Gen 2, with BC 1.2) 1 Mini DisplayPort™ 1.4 1 HDMI 2.0b1,	MANDATORY

SERVICE AND SUPPORT	3-years and 1-year limited warranties and 90 day software limited warranty.	
Fingerprint reader	Fingerprint	MANDATORY
ANTI-THEFT PROTECTION	cable Lock	MANDATORY

Software	Bing search for IE11; Hotkey Support; Noise Cancellation Software; Performance Advisor; Support Assistant; Native Miracast support; Connection Optimizer; Cloud Recovery; ZCentral Remote Boost Software;	
Warranty	a 3-year standard limited warranty	MANDATORY
Environmental specifications	Low halogen	MANDATORY
Wireless technologies	Optional Near Field Communication (NFC) module	MANDATORY
Digital Wireless Mouse Technical Specifications	**Sensor technology** • Darkfield high precision • Nominal value: 1000 dpi • DPI (Minimal and maximal value): 200 to 4000 dpi (can be set in increments of 50 dpi) **Buttons** 7 buttons (Left/Right-click, Back/Forward, App-Switch, Wheel mode-shift, Middle click) Scroll wheel: Yes, with auto-shift Thumbwheel: Yes Gesture button: Yes Wireless operating distance: 32.81 ft (10 m) **Battery** Rechargeable Li-Po (500 mAh) battery Get three hours of use from a one-minute quick charge. **Dimensions** Height: 2.01 in (51 mm) Width: 3.32 in (84.3 mm) Depth: 4.92 in (124.9 mm) Weight: 4.97 oz (141 g)	MANDATORY

PART E: TECHNICAL REQUIREMENTS

1. MECHANICAL EQUIPMENT AND PIPING

1.1. GENERAL

1.1.1. Statutory Regulations

The Works and all equipment and materials forming part of this Contract shall comply in all respects with any relevant statutory regulations, by-laws or orders currently in force where the Plant is to be erected.

1.1.2. Geothermal

The Works shall be suitable in all aspects of design and construction for continuous operation in a geothermal environment. There are elevated levels of H_2S and other contaminants in the surrounding environment and process fluid.

1.1.3. Civil and Building Works

The requirements for the buildings, foundations and other civil works are described in respective civil Part of this specification.
Where items of mechanical plant are mounted on foundations which are part of the civil engineering works, the CONTRACTOR shall carry out suitable levelling and adjustment of the plant on the civil foundations before the plant is secured in position by suitable non-shrink grouting. The CONTRACTOR shall check the alignment, levelling or positioning of the mechanical plant in question, before and after grouting. The CONTRACTOR shall make records of the alignment, levelling or positional measurement and shall maintain such records until his activities at site are concluded.
Where large and complex plant is installed on extensive foundations, a datum shall be established to check for movement or settlement of the foundations.
The building steelwork shall be designed to carry the loads and forces imposed by pipe work, cables and associated fittings which also form part of the works, and all necessary supports and fixings shall be shown on the relevant drawings.
Such supports and fixings may be secured to the steelwork by bolting welding or clamping.
No other supports or fixings shall be subsequently attached to the steelwork nor may any other drilling, cutting or welding be carried out without the prior permission of the Engineer.

1.1.4. Contractor's Responsibilities

The CONTRACTOR will be deemed to have concurred as a practical manufacturer with the design and layout of the Works as being sufficient to ensure reliability and safety in operation, freedom from undue stresses and satisfactory performance in all other essentials as a working plant, unless stated specifically to the contrary prior to the award of the Contract with full supporting explanations.
Without affecting the provision of the Conditions of Contract the Contract shall include the whole of the Works which are described in or implied by the specification. All matters omitted from the specification, which may be inferred to be obviously necessary for the efficiency, stability and completion of the works, shall be deemed to be included in the Contract price.
Those items of the works shown upon the drawings and not mentioned or described in the specification and those items of the works described in the specification and not shown on the drawings will nevertheless be held to be included in the same manner as if they had been expressly shown upon the drawings and described in the specification.
The CONTRACTOR shall fully familiarize himself with the existing underground services in the vicinity of the buildings, plant and equipment to be provided under this Contract. The CONTRACTOR shall include in the Contract Price for the modification and re-routing of such services where this is necessary to facilitate the construction of buildings, plant and equipment supplied under this Contract.

1.1.5. Safety and Security

1.5.1 Noise – general
The plant and equipment supplied under this Contract shall meet the noise level requirements for both general work area limits and neighborhood noise limits as specified herein.
Noise levels measured or calculated from measurements after background and other corrections have been applied and after any appropriate tolerances have been allowed in accordance with the given standards must not exceed the noise limits specified.
The sound level meter used for the tests shall be of the precision type and comply with the British Standard BS EN 61672.

The octave band pass filter set shall comply with BS EN 61260. The 'slow' meter response setting shall be used.

1.5.1.1Noise during erection and commissioning

The CONTRACTOR shall take all reasonable measures to minimize noise nuisance arising from construction, erection, pre-commissioning and commissioning activities. If a noise level exceeding 100 dB(A) is likely to occur in any area, suitable warning signs shall be prominently displayed in that area, indicating that a noise hazard exists, and that ear protection muffs should be worn. Any area where noise levels could exceed 115 dB (A) shall be cordoned off to prevent unprotected personnel from entering the area.

1.5.1.2 Work area limits

The un-weighted octave band sound pressure levels in dB measured at the 9 Centre frequencies from 31.1 Hz to 8 kHz in any position in the work area, including the noisiest position, 1 meter from the surface of the equipment or equipment package or at the operators work position shall not exceed in any band, the levels given by the ISO NR 80 noise rating curve when all the equipment is operating at 100% base load.

The above limits apply to broad-band noise only. If any narrow band components of the noise is present it shall be suppressed below the actual broad band noise levels (as calculated or measured) by the amounts given in the following Table:

Octave band	63	125	250	500	1K	2K	4K	8K HZ
Required Suppression	0	0	0	4	6	7	7	3 (DB)

Any impulsion noise components shall not exceed 80 dBA.

1.5.1.3 Neighborhood noise limits

Silencing equipment shall be provided for the plant, as may be necessary, to ensure that the sound pressure levels, as measured 1.25 meters above ground level at any point 125 meters from the plant when all the equipment is operating at its maximum base load rating or any other operational condition, shall not exceed the following values, which correspond to ISO noise rating no.45:

Octave bands	1	2	3	4	5	6	7	8	
Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Pressure level dB (ref.0.0002 micro bar)
Sound	71.0	61.1	53.6	48.6	45	42.2	40.0	38.3	

1.5.1.4 Guarantees

If measurements on site show that the above sound pressure levels are exceeded the CONTRACTOR shall undertake approved modifications in order to meet the specified requirements at no extra cost to the Employer.

1.5.1.5 Noise suppression enclosures

In order to meet the foregoing noise limitations, the CONTRACTOR shall request Employer/Engineer’s approval to provide noise suppression enclosures or buildings around any noisy plant items, such as for example, the main turbines, pumps and their drive equipment large electric motors. These noise suppression enclosures may also serve as weather protection for the respective plant item. The "cells", formed around transformers for protection from fire or transformer rupture may also be considered to act as noise suppression enclosures.

Within any enclosure, building, earth bank or other civil works intended to suppress noise it will not be necessary to achieve the noise limits specified. The CONTRACTOR's design shall, however, include reasonable measures to restrict noise. In no case shall the noise exceed 115 dB(A) if operating staff are able to enter the enclosure with the plant in operation, unless the CONTRACTOR has previously demonstrated to Employer/Engineer’s satisfaction that it is not practicable within the current "best practice” to avoid breaking this limit.

Where operating staff may have to enter noise suppression buildings or enclosures for supervisory purposes or minor repair work with the plant running, the access doors shall be clearly marked to indicate a noise hazard and with a symbol to show that ear protection muffs should be worn.

The CONTRACTOR shall pay particular attention to the control of noise arising in the reduction of pressure.

1.5.1.6 Noise survey

When all normally operating equipment or plant is operational, the CONTRACTOR shall carry out a noise survey of the site, to check at agreed locations and in agreed buildings that each of the aforementioned noise limits are not being exceeded. The CONTRACTOR shall arrange with the Engineer to carry out the survey with Guarantee Case steam flow through the Vent Station or at other such condition as the Engineer may select. The Engineer may instruct the CONTRACTOR to include in this survey measurements in specific places.

The CONTRACTOR shall submit a report to the Engineer summarizing the results of the noise survey. If the specified

noise limits are exceeded, the
CONTRACTOR shall modify the plant or provide additional noise control features, and re-measure the noise levels in the area in question.

1.5.2 Hazardous areas

The CONTRACTOR shall take full account of any special requirements concerning the nature, handling and storage of all oils, gases and chemicals etc., including gases present in the atmosphere such as H_2S, and provide plant, equipment, buildings and other services accordingly including all facilities to ensure the safety of the operating and maintenance personnel.

The CONTRACTOR shall provide a report describing the principles of explosion protection and drawings and action procedures to define all the hazardous zones taking account of all sources of hazards under normal and abnormal operating conditions, (regardless of whether or not these areas are specifically listed in the specification). The zoning philosophy shall be in accordance with International Standards and subject to the approval of the Employer/Engineer.

In particular, equipment directly concerned with plant which may give rise to a hazardous situation shall be designed to IEC 60079 Zone 1 or 2 requirements with electrical connection safety barriers or intrinsically safe equipment equivalent to IEC 60079-11 Type Exi or equal and approved by the Employer. Where required by the Engineer, certification shall be provided to confirm the suitability of the equipment and devices.

Electrical equipment shall not be installed in Zone 0 areas without the approval of the Employer/Engineer, though this does not preclude cables passing through such areas.

The CONTRACTOR shall be responsible for ensuring that all electrical equipment installed in any hazardous zone is designed and tested to suit the relevant zone classification and shall be to the approval of the Employer/Engineer. Cables shall not be laid in trenches etc. with fuel pipe work.

1.5.3 Access for operation & maintenance

The CONTRACTOR shall supply and erect sufficiently large safe platforms, galleries, stairways and access ways necessary for providing safe and easy access to all the plant items for operation and maintenance. The CONTRACTOR shall ensure that the whole of the access ways are of uniform design and pattern throughout the works.

Ladders are only to be provided as an extra means of escape.

Access ladder and large platforms shall be provided for access to all equipment, components, valves, instruments etc. complete for operation & maintenance use irrespective of the frequency for operating and maintaining them.

The maintenance platforms shall be strong enough and large enough to place disassembled components and all tools during maintenance.

Vehicle access shall be provided to all mechanical, electrical and instrumentation equipment.

1.5.4 Interlocks

A complete system of interlocks and safety devices shall be provided so that the following requirements and any other condition necessary for the safe and continuous operation of the plant are provided:

a. Safety of personnel engaged on operational and maintenance work on the plant.
b. Correct sequence of operation of the plant during starting up and shutting down periods.
c. Safety of the plant when operating under normal or emergency conditions.

Interlocks shall be preventive, as distinct from corrective in operation. Where plant supplied under this Contract forms the whole or a part of a system for which one or more interlocking schemes are required, the

CONTRACTOR shall be responsible for all interlocking schemes to the
Employer/Engineer's approval. General descriptions of interlocking requirements are given in the requirements but the CONTRACTOR shall include for any other interlocks he considers necessary.

1.5.5 Guards

All moving parts, shafts, couplings, flywheels, bare conductors and hot or cold surfaces shall be adequately and securely guarded in accordance with the prescribed legislation and to Employer/Engineer's approval so as to afford complete safety to all personnel.

1.5.6 Locks, padlocks & key cabinets

The CONTRACTOR shall provide padlocks, locks, chains or other locking devices for the locking of all equipment cubicles, electrical isolating switches, selector switches, valves etc. to the approval of the Employer/Engineer.

Multi lock systems shall be in accordance to the requirements of the British Safety Council.

All locking devices and chains shall be manufactured from corrosion resistant material suitable for the site. All mechanisms shall be provided with a cover to minimize entry of water or dust.

Certain locks may be required to conform to a master keying feature to be agreed with the Engineer for groups of equipment.

All locks shall have individual high integrity locks and shall be provided with three keys.
Each key shall be provided with a label.
The CONTRACTOR will supply and fit key cabinets equipped with labelled hooks, each identified with its appropriate key. Every cabinet shall be provided with a nameplate identifying the cabinet with its respective item or items of plant.
Sufficient cabinets will be provided to store all keys supplied under this Contract.
The CONTRACTOR shall provide comprehensive lock and key schedules to readily permit identification with equipment and doors. Such schedules are not required for loose padlocks.
The CONTRACTOR shall supply a suitable shear cutter for cutting padlocks in case padlock keys fail to open the locks during any emergency.
Every kind of hinged door in switchboards panels, control panels, cubicles and boxes as well as withdrawable chassis shall be secured by means of a suitable lock. As a general rule, the following methods of locking shall be adopted:

- Electrical distribution boards, local power or control boards and boxes shall be equipped - dependent on their size - with one or more carriage locks having a square plug and key being the same throughout the plant.
- All explosion-proof equipment is to be provided with the same type of lock, however, with triangle plug and key.
- All boards, boxes and cubicles containing electronic type equipment shall be provided with tumbler locks and each type of cubicle shall receive its own key which will fit throughout.
- Key operated selector switches are to be provided with a tumbler lock for locking in the neutral position or in any other position as per requirements. Such keys shall fit a group of switches of similar kind and purpose and the key system shall be the same as stated above.

All keys in the Plant shall follow a uniform Master Key system. The CONTRACTOR shall prepare a comprehensive key system proposing the individual group and master keys and the quantity of the same. The organization of the key system is subject to Employer's / Engineer's approval.
Each key lock shall be supplied with at least three keys. At least three keys shall be provided for on each master key level.
All keys are to be handed over to the Employer in properly sized and labelled key box for wall mounting installed in approved locations.
A key cabinet shall be provided in each electrical/ electronic room for storing the relevant keys.
The keys for cubicles/ equipment located outside electrical rooms as well as the keys of the individual key cabinet doors shall be stored in a central key cabinet, located in the central control room.
For the key cabinet doors additional six master keys shall be provided, each suitable to open any key cabinet door.
Each key shall have an identification label with the same denomination as fixed above the key hanging hook inside the cabinet.
For padlocks a similar master key system shall be provided, not necessarily combined with the master key system of the cubicles, cabinets and panels.

1.5.7 Safety measures

The CONTRACTOR shall ensure all safety measures in accordance with the safety manual as per Project Procedure Manual during the period of the Contract. The CONTRACTOR shall not in the performance of the Contract in any manner endanger safety or unlawfully interfere with the convenience of the public or jeopardize the operation or security of the Employer's existing system.

If any damage is caused to existing plant/system, the Engineer shall have the right to stop any construction/commissioning works carried out by the CONTRACTOR which jeopardize safety of personnel and plant/system at his discretion.
If any damage is caused to existing plant or building/installation by the CONTRACTOR's or his Subcontractor's plant, machinery, personnel or vehicles, it shall be the responsibility of the CONTRACTOR to make good damage at his own cost to Employer/Engineer's satisfaction.

1.5.8 Maintenance isolation

All major equipment shall be arranged to facilitate safe isolation from all hazards for maintenance purposes. In addition all valves must be capable of being locked either in the open or closed position by means of a chain and padlock.
Non return valves are not acceptable as a means of isolation.
Sufficient draining & depressurizing valves for isolation maintenance shall be provided.

1.5.9 Signs

1.5.9.1 General

Safety colours, safety symbols and safety signs must comply in construction, geometrical form, colour and meaning with

the ISO 3864-1:2011 and ISO 7010:2011.
Signs of plant identification during the erection period must be to the Employer‘s approval.
The signs should be of a material which is weather resistant and of sufficient durability for the conditions prevailing on site.

1.5.9.2 Mounting & Installation

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

1.5.9.3 Information signs

Information signs should supply the necessary information to acquaint personnel with the physical arrangement and structure of site, buildings and equipment, e.g. floor numbers, load carrying capacities including marking of floor areas, working loads of cranes, lifting gear and lifts, room identification, etc. The routing of underground pipes and cables is to be indicated by substantial marker blocks showing the relevant identification numbers.
In the choice of information signs in situations not covered by ISO standards the possibility of using pictograms should be considered. Pictograms are particularly suitable for the identification of rooms, areas and buildings in the non-technical areas of the plant, sanitary and amenities buildings, etc.

1.5.9.4 Emergency signs

In the event of accidents, all necessary information should be available immediately to those affected. Thus, a sufficient number of signs of appropriate size should be installed, e.g. escape routes, first aid equipment, first aid points, accident reporting points, telephones, etc.

1.5.9.5 Mandatory signs

Signs indicating obligatory actions must be provided installed wherever certain action is necessary, e.g. do not obstruct the entrance; keep right, etc.
Signs should also indicate when the wearing of protective clothing and equipment is necessary and obligatory, e.g., protective goggles, protective clothing, helmets, head guards, breathing equipment, ear muffs, etc.

1.5.9.6 Warning signs

Warning signs should refer to the existence or possible existence of danger, e.g., flammable substances, explosive substances, corrosive or noxious substances, suspended loads, general danger, width/height restriction, steps, risk of trapping, slipping, falling, etc.
In addition to warning signs, appropriate black yellow strip markings should also be used where necessary.

1.1.6. Labels, Plates and Tags

1.6.1 General

The CONTRACTOR shall supply and install all labels, name ratings, instruction and warning plates necessary for the identification and safe operation of the Works. Samples shall be submitted for the approval of the Employer/Engineer.
The CONTRACTOR shall prior to take over of each Section of the Works, submit a detailed breakdown list of the complete plant of that Section together with description, location and value for the purpose of updating the Employer's Fixed Assets records. This list may be reformatted by the Employer and given to the CONTRACTOR with Fixed Asset identification numbers allotted to each item and the CONTRACTOR shall thereafter incorporate such asset number in the appropriate number plates used for the corresponding equipment identification under the contract.
The following general requirements shall apply for the labels, plates and tags of the power plant:
All plant, components shall be provided with sufficient labels, tags, plates, etc. so as to allow correct operation, easy testing and efficient maintenance. In order to distinguish amongst the variety of plates for the various purposes, a classification is given herewith below:

- Rating plates (A) according to IEC/National/Manufacturer's standard.
- Designation plates (B) to characterize the kind and nature of a self-contained installation by brief description and/or plant I.D. number.
- Operation/service plates (C) to characterize the functions of control elements or instruments.
- Equipment -/cable-/tray tags (D) with embossed or printed code description for identification with reference documents.
- Alarm windows (E).
- Instruction plates (F) for operation, maintenance, inclusive warning plates from electrical hazards.
- Orientation plates (G).

All plates, tags, etc. shall be properly arranged, duly sized and being produced that the intended purpose without getting faded or deteriorated can be met. The material used shall be in accordance with the following selection guide:

- Outdoor: stainless steel
- Indoor: stainless or aluminum with translucent coating or dual colored laminated plastic

- **All plastic material must be heat resistant, no PVC material is permitted.**

- **The writing is to be engraved, embossed or durably printed to suit perfectly the purpose.**

- **The writing is to be provided in the English language. Labels, warning and name plates shall all be in English language.**

- **Material and size of all categories of plates etc. shall be described in one comprehensive document. All such documents shall be prepared by the CONTRACTOR and submitted to the Employer for approval.**

- **Tags for Equipment, Cables, etc.**

Every electrical and I&C component as part of a self-contained equipment such panels, desks, boards etc. is to receive a tag with printed or embossed code numbers in compliance with the reference drawing. Such tag may be of the adhesive plastic type. When completely installed, every individual cable as well as cable tray shall at each end and at intermediate positions (approx. every 50 m) receive metal tag with engraved or embossed code numbers.

- Instruction Plates (F) shall be of descriptive nature and bear symbols such as danger signal for high voltage. Writing or symbols shall appear black on yellow plate surface.
- "*High Voltage*" hazard plates are to be provided for all installations of 600 *V* and above and shall be directly attached to the respective equipment as well as to doors, walls, fences, surrounding such installations.
- Orientation Plates (G) Such plates bearing only a symbol (pictogram) or plant I.D. number are intended to support orientation in widespread or complex installations. Plates shall be of same pattern as specified for type (F) plates, and shall be provided wherever requested by the Employer.
- Single-Line Diagrams: Every switchgear room compartment shall be furnished with a copy of the final as built single-line diagram detailing all electrical data and denominations, separate for each individual switchgear distribution board/MCC, put under glass and aluminum frame and mounted on the wall.
- DCS Cubicles: Every and each DCS cubicle shall be furnished with a copy of the final as built terminal diagram, put under glass and aluminum frame and mounted on the wall.
- Door Labels: Door labels for numbering, designation for offices, toilets and other occupied areas as well as technical rooms shall be provided by the CONTRACTOR.

1.6.2 Piping identification & flow direction arrows

A piping identification system shall be applied for the plant piping, using colour strips around the pipes. These colour strips shall be painted, adhesive plastic material colour strips shall not be accepted.

Flow directions arrows and identification inscription shall be arranged in important place as well as at the inlet branch connections, downstream of each valves and dampers and in the vicinity of branching-off connections.

The CONTRACTOR shall propose, for the Employer's / Engineer's approval, a colour scheme for the pipe work included within this Contract. The colours employed shall be based on the Employer's existing scheme to be advised after award of contract, with any necessary amendments to suit the equipment provided.

Colour bands shall be painted on each side of all valves and equipment in the piping systems. The use of adhesive-backed colour bands shall not be permitted.

Valve labels shall be circular and fitted under the hand wheel captive nut. For check valves and small valves the CONTRACTOR may provide rectangular labels fitted to the valve or secured close by the valve.

The inscription or "name" on each valve label shall summarize the duty of the valve, and the number shown on each valve label shall be the number in the unified plant valve numbering scheme as specified for the Plant. The name plate shall be made from stainless steel with proper fastening arrangements.

Where the direction of flow through a valve or other device is an important requirement for correct functioning, the body of the valve or device shall be legibly marked with a cast on, or alternatively, a properly secured arrow, showing the direction of flow.

Pipe work shall be provided with plentiful large painted arrows or other secure and durable arrow markings to allow the

flows of fluids around the plant to be readily understood.
In addition to the colour band coding, pipe work and vessels shall be liberally labelled, in large painted letters on the exterior of the insulation cladding, stating the fluid conveyed or contained.

1.6.3 Plant identification labels and tags

Every and each equipment and device, mechanical, electrical, I&C or other shall be provided with labels (engraved), tags, plates, etc. so as to allow easy testing, efficient maintenance and correct operation locally and from the Central Control Room. The inscription of the labels, tags, plates, etc. shall include the KKS number of the equipment.
The very same identification numbers and clear text descriptors shall be used in any documentation, in the control system database, on the screen representations and on the printed logs and protocols. Labels, warning and name plates shall be in English.
The following rules shall be considered.

Location/Item to be labelled	ID No.	Clear text	Remarks
Minor process equipment, like valves, etc.	X		
Major process equipment, like tanks, motors, etc.	X	X	
Tapping points	X	X	
Tapping points for local indicating instruments	X	-	If close to the tapping point
Thermocouples, PT100	X	X	
Transmitters, switches, local controllers	X	X	Fixed on the Rack, Cubicle,
Transmitters, switches, local controllers	X	-	Fixed on the instrument (non- removable part)
Local indicating instruments, level gauges	X	X	Fixed on the Rack or on the Hook up, but not on the dial
Local cabinets, cubicles and boxes	X	X	
Local panels, main label	X	X	Panels for operation
Electronic Room cubicles	X	X	
Control Room Desk and Panels	X	-	
Process computers, couplers, Gateways, Hubs, Switches, Printers, etc.	X	-	
Cubicle, panel internals	X	-	According to the wiring, diagram etc.
Push buttons and other operating elements	X	X	ID No. is not to be repeated for groups
Alarm windows	X	X	
Major I&C installation	X	X	E.g., Packages, Plants
Printed protocols	X	X	

1.6.4 Warning plates & inscriptions

Individual plant items and all relevant areas within the contract works where a danger to personnel exists shall be proved with plentiful, prominent and clear warning notices.
These warning notices shall draw attention to the danger or risk with words in English which attract attention and summarize the type of risk or danger The notices shall also carry a large symbol which graphically depicts the type of

risk.
LV switchboards located outside electrical rooms shall have yellow labels, with 5 cm black letters reading "ATTENTION **...** V".
Transformer boxes shall have red labels with 7.5 cm white letters reading
"ATTENTION HIGH VOLTAGE ... kV".
Labels (lettering as before) shall also be fixed at switchgear room doors. Battery rooms shall be provided with a white

label reading "BATTERY

ROOM", engraved in black.

1.6.5 Identification & warning plates for civil works
Traffic signs for the roads have been specified under section for Civil and structural
Information plates for underground services shall be in compliance with Employer's and /or Local rules and regulations

1.6.6 Size & material of labels, plates & inscriptions
The fixtures shall be of non-corrosive material. The fixation shall be done rigidly. Labels on chains, wires or glued labels (except cubicle inside minor elements) will not be accepted. Labels shall be fixed on non-removable parts.

1.1.7. Outdoor Plant Rating, Weather Protection and Sunshades

Outdoor plant shall be rated and constructed so that its performance, operation, reliability, maintenance, or life shall meet the specified design and operating conditions.
Where personnel have to be in attendance frequently or maintenance has to be regularly carried out, permanent minimum weather protection or sunshades shall be provided.
Where the performance reliability or life of the plant would be adversely affected by solar radiation, including the effects of prolonged exposure to ultraviolet light, suitable sunshades shall be provided. Such sunshades shall be constructed from fibre-glass which is able to withstand the effects of the ambient conditions on site without suffering any deterioration in material strength or effectiveness.
Sunshades need not be provided on outdoor plant or equipment provided the manufacturer can show that no materials employed will be adversely
affected or the temperature rise due to internal heat generation plus that due to solar radiation does not exceed the equipment design temperature.
Sunshades shall protect plant and personnel when the sun is more than 45 degrees above the horizon. They shall not impede the operation or maintenance of the plant or the movement of ventilating air. Facilities such as lighting and lifting beams and rainwater drainage shall be provided wherever necessary to the approval of the Employer/Engineer as an integral part of the sunshade structure.

1.1.8. Trenches for Pipes, Cables and other Services

a. As far as is practicable all piping, drains etc. shall be arranged so that they may be run above ground level
b. The use of buried pipe work will be subject to Employer/Engineer's approval.
d. It is envisaged that it will only be necessary to take pipes below general site levels to pass under roadways. When taken below ground level for this purpose the pipes shall be positioned in concrete-lined culverts of sufficient dimensions to provide crawling access for maintenance staff. Any culverts shall be provided as part of this contract.
e. The trench width and pipe spacing shall be adequate for insulation, to do pipe replacement, brushing and painting the pipes and supports for maintenance.
f. All trenches shall be sloped and self-draining with no stagnation of water. This applies to pipes in trenches as well as pipe racks.
g. Pipes and cables shall not run in the same trench.

1.1.9. Packing and Marking

1.10.1 General
All plant and equipment shall be packed in accordance with the requirements of the supplier's recommendations, and the details in this specification.
Nothing in these instructions shall relieve the CONTRACTOR of liability for any loss or damage arising out of deficient

or inadequate packing.
Packing and any special freight instructions shall be clearly stated on orders and sub-orders.
If appropriate, arrangements should be made by the CONTRACTOR for special/valuable items to be supervised during transfer and storage at various points along the route and requirements in this respect should be advised at the same time as packing information.
All items containing internal packing /preserving /anti-corrosion materials shall be clearly marked to show this fact, to ensure that the packing/ preservative materials are removed prior to installation/commissioning.
All packing wood, empty cable drums resulting from plant erection shall remain the property of the Client.

1.10.2 Cleaning & protection before shipment
All bright metal parts shall be covered before shipment with an approved protective compound and protected adequately during shipment to site. After erection these parts shall be cleaned with a correct solvent and polished bright where required. The CONTRACTOR shall supply the Engineer with correct information relating to the necessary removal of solvents required for the protective compounds applied in order to protect the Plant items during shipment and storage. These solvents shall be both non-toxic and non-flammable.

Any protective coatings that may be specified elsewhere in this specification shall be applied after tests have been carried out.
Pipes, valves and other similar parts of the Plant which are subject to hydraulic test and are not readily accessible for drying out shall on completion of tests at the manufacturer's works, be drained and washed with an approved dewatering oil prior to the application of the specified protection during transit and prior to site erection.
Valve packings shall be removed after hydraulic test and replaced with dry packing.
All parts, which will ultimately be buried in concrete, shall be cleaned and protected before leaving the factory by a cement wash or other approved method. Before being handed over for building-in they shall be thoroughly descaled and cleaned of all rust and adherent matter by wire brushing.

1.10.3 Packaging design
The packing requirements should be reviewed and confirmed 3 months before dispatch.
Packaging should be in accordance with the relevant Sections of BS 1133 and should be designed with regard to:

a. Type of transport to be used.
b. Intended (and possible alternative) route.
c. Possible weather conditions along route.
d. Labour and handling facilities available along route.
e. Design of item to be packed, so that all necessary cradles, supports, chocks, protective padding and lashings can be included in the packaging design.
f. Protection against fresh or salt water and/or water vapour.

Tube ends and other similar open ends shall be protected from both external damage and ingress of dirt and moisture during transit and while awaiting erection at site. Flanged pipes shall have their open ends protected by adhesive tape or jointing and shall be covered with a wooden blank flange adequately secured.
Precautions shall be taken to protect shafts and journals where they rest on wooden or other supports likely to contain moisture.
At such points wrapping impregnated with anti-rust composition or vapour phase inhibitors shall be used of sufficient strength to resist chafing and indentation due to movement which is likely to occur in transit. The form of the protective wrappings and impregnation shall be suitable for a period of twelve months.
Lids and internal cross battens of all packing cases shall be fixed by screws and not nails.
Hoop metal bindings of cases shall be sealed where ends meet and if not of rust material shall be painted.
Contents of cases shall be bolted securely or fastened in position with struts or cross battens and not with wood chocks wedged in place, unless they be fastened firmly in place. All struts or cross battens shall preferably be supported by cleats fixed to the case above and below to form ledges on which the batten may rest. Cases shall be up-ended after packing to prove that there is no movement of contents.
Where parts are required to be bolted to the sides of the case, large washers shall be used to distribute the pressure and the timber shall be strengthened by means of a pad.
Wood wool shall be avoided as far as possible for packing purposes.
Waterproof paper and felt linings shall overlap at seams at least 13 mm and the seams secured together in an approved manner, but the enclosure shall be provided with screened openings to obtain ventilation.
Where practical, all indoor items such as electric motors, switch and control gear, instruments and panels, matching components etc. shall be "cocooned" or covered in polythene sheeting, sealed at the joints and the enclosures provided internally with approved desiccators.

In the case of ball or roller bearings installed in any item of plant the CONTRACTOR shall include and ship with the plant, one complete set of spare bearings. If replacement of any bearings are required due either to indentation during shipment or other causes during the maintenance period the spare bearings shall be used to replace the faulty bearings and the CONTRACTOR shall replace those used, free of charge, so that at the end of the maintenance period the plant shall be in full running order and a full set of spare bearings shall be available.

The Engineer may require inspecting and approving the packing before the items are dispatched by the CONTRACTOR, who shall be entirely responsible for ensuring that the packing is suitable for transit and such inspection will not exonerate the CONTRACTOR from and loss or damage due to faulty packing.

1.10.4 Marking of packages

All packages shall be marked with the following information on two opposite sides and on the top, using fade proof, waterproof and salt proof black ink:

CLIENT
CONTRACT
CONTRACT NO.
EQUIPMENT NO.
GROSS WEIGHT
NET WEIGHT
MADE IN PACKAGE NO.
NAME OF VESSEL:

Characters shall be at least 50 mm high unless package is too small, in which case the size shall be in proportion.
If marking tags have to be used on bundled structural material, the tags shall be made of metal and clamped flat to each bundle. Paper or cloth tags are not acceptable.
Packages shall be marked on all four sides with arrows pointing to the top.
Fragile or perishable materials shall be marked with the appropriate symbol, i.e. FRAGILE, HANDLE WITH CARE, COOL STORAGE, REFER STORAGE, USE NO HOOKS.
When required due to length or unbalanced weight, containers or pieces shall have centre of balance indicated by painted stripe extending upward on each side with wording "CENTRE OF BALANCE".
Sling marks shall be shown as required.
Fabricated sections of structures and equipment shall have their respective piece marks permanently stamped into the piece to a minimum depth of
1.0 mm and the stamped areas painted with corrosion protective paint of a different colour to the base colour. Characters shall be at least 10 mm high.
On vehicles, unboxed earth moving equipment or materials handling equipment etc. the markings may be shown on a notice suitably fastened to the windshield etc. These shipping marks are separate from and not to be confused with vehicle or equipment colour requirements and equipment identification numbers.

1.10.5 Documentation

A copy of the packing list shall be placed inside each shipping package. copy of the packing list in a waterproof envelope shall be securely fastened to unpackaged pieces or bundles.
Packing lists shall indicate the name of the Client/CONTRACTOR and the Contract number.
Separate packing lists shall be prepared for each and every shipment made. In the case of several packages included in a single shipment, more than one package may be included on one packing list, providing all required information is shown for each package.
The following information shall be provided for each package:

a. Description of package i.e. box, crate, drum, bundle etc. b. Package number
b. General description of contents corresponding to the invoice.
c. Equipment number where applicable.
d. Gross, tare and net weights in kilograms.
e. Dimensions of package.

Packing lists shall detail complete export marks as indicated in "Packing and Marking Instructions"

2. STEEL STRUCTURES, PLATFORMS, STAIRWAYS, LADDERS AND HAND RAILING

All steel structures shall comply with "General Requirements – Civil and Structural Works".

Structural Steel

The supporting structure shall be designed considering the internal forces and expansions, as well as forces from wind, earthquake, etc.

Consideration shall be made that the steel structure can also take forces of piping systems that are supported from it, including forces resulting from water filling of the pipes during the hydraulic test.

Special care shall be given to the design of pipe supports for steam pipes, which must be able to support these pipes during water filling (hydraulic test). In order to avoid overstressing of the pipe supports and the associated foundations, the most critical loading condition shall be considered.

Girders for fixing lifting appliances shall be installed above all components having a weight of heavier than 50 kg when dismantling and assembling equipment for maintenance and overhaul, in case this component cannot be reached with a permanent or mobile crane.

Access platforms, galleries and stairways for all equipment that requires frequent operation, checks or maintenance (manholes, valves, instruments, pumps, etc.) shall be provided. All valves and instruments shall be accessible from fixed installed platforms, wherever possible. Mobile facilities will only be accepted as exception.

All steel structure shall be delivered complete with base plates, anchoring bolts, embedded items etc. All parts of steelwork and foundation bolts, which are required to be built into foundations, or are necessary for the support of the plant, shall be the first priority of delivery.

Using monkey ladder anywhere especially the places where maintenance is required regularly are not allowed.

All galleries, platforms, stairways and hand-railing shall be of galvanized and painted steel unless otherwise specified.

The arrangement of galleries, platforms, catwalks and stairways shall be submitted for Employer/Engineer's approval.

Ladders are only to be provided as an extra means of escape.

All aspects of platforms, stairways, ladders and other access ways shall comply with the requirements of ISO 14122-3, unless otherwise stated.

As far as practicable the flooring, stair treads and hand-rails shall conform to a uniform pattern throughout the whole of the Contract Works.

3. NUTS, BOLTS AND WASHERS

The threads and other details of fasteners for pressure equipment designed and built under an ASME standard shall be per ASME standards with unified threads (UNC, UN8)

All other fasteners shall comply with ISO Standards issued by Technical Committees 1 and 2 (ISO/TC1 & ISO/TC2) for metric series fasteners.

Nuts and studs for pressure parts shall be made of materials from the relevant ASTM or ASME standard for the service and the pressure equipment material. The material of all other bolts, studs and nuts shall conform to the requirements of EN standards, BS standards and ISO standards.

Nuts, bolts and studs shall be of materials most suitable for the service operating conditions and designed to ensure the stresses arising in normal operation shall not exceed those necessary to ensure that the specified plant life is achieved.

Fitted bolts shall be a close fit in the reamed holes they occupy, and shall be marked in a conspicuous position to ensure correct assembly.

Stud holes in those parts of the plant which are subjected to heat in use shall be adequately vented.

The threaded portion of any bolt or stud shall not protrude more than 1.5 threads above the surface of its mating nut.

Where practicable the use of slotted head screws shall be avoided in machinery component assemblies, hexagon socketed screws being preferred.

Correct size of bolt and studs shall be used for the particular items. Cutting the threaded position of the excess length stud or bolt shall not be permitted.

4. STEEL FORGING

The CONTRACTOR shall draw up material specifications of all important forgings (other than those for code pressure equipment governed by ASME/ASTM standards) and supply copies of these specifications to the Employer/Engineer's for his use. In each case the quality and inspection requirements shall be clearly stated.

Wherever possible steel forgings shall be in accordance with the requirements of EN Standards, BS Standards BS EN 10250, PD 970, the equivalent ISO Standards, or agreed national standards.

Test blocks from which mechanical test pieces will be machined shall be cut from forgings at positions to be agreed by the

Employer/Engineer. On large and important forgings several test pieces shall be taken from radial and longitudinal directions.
All forgings shall be manufactured from basic electric steel or fully killed acid open hearth steel. Consideration shall be given to the use of vacuum degassed steel in appropriate cases.
Forgings shall be free from cracks externally or internally, extensive non- metallic inclusions and surface defects. The CONTRACTOR shall carry out non-destructive testing of forgings during machining to verify that no unacceptable defects are present.
Repairs by welding or other means shall not be undertaken on forgings at any stage of the production cycle.
Each forging shall be suitably branded with an identification number which shall be transferred throughout all final machining stages. The identification number shall be marked on all documents and test certificates relative to the forging.
Forgings for code pressure equipment shall comply with all relevant rules from ASME and ASTM standards (material composition, testing, marking, traceability, etc.).

5. CASTINGS

5.1 General

Test bars shall be provided from medium and large castings for all necessary material and chemical tests which are to be witnessed by the Employer/Engineer. If required by the Employer/Engineer any castings for rotating or highly stressed parts are to be subjected to non-destructive testing by approved methods including radiographic and ultrasonic means, the cost of which will be borne by the CONTRACTOR.
All castings shall be homogeneous, free of shrinkage, pipes, under sizing, porosity or voids. "Bum-in" repairs are not acceptable and no welding, filling, interlocking or plugging of defective parts shall be done without the Employer/Engineer's approval in writing. All repairs shall be subjected to non-destructive examination (ultrasonic, X-rays, gamma-rays) after heat treatment. Welding repairs to castings that will be in contact with corrosive liquids such as seawater or brine will only be permitted under special circumstances.

5.2 Steel Castings

The CONTRACTOR shall prepare material purchasing specifications for all important castings (other than those for code pressure equipment governed by ASME/ASTM standards). Each document shall indicate fully the quality and inspection requirements for the component casting covered. Copies of the specification shall be issued to the Employer/Engineer for use.
Castings may be repaired by welding providing the approval of the Employer/Engineer is first obtained. The CONTRACTOR shall submit drawings, sketches or photographs showing the location and principle dimensions of the defect together with the proposed weld repair procedure.
Weld repairs will only be permitted if a casting defect is within the following criteria:

Maximum length of defect	- 20mm
Maximum width of defect	- 10mm
Maximum depth of defect	- no greater than 10% of the wall thickness

Only welders who have passed an appropriate qualification test shall be employed on the repair of castings. All repairs shall be carried out by the metal arc process.
Ultrasonic inspection shall be applied to all important castings to locate the extent of sub-surface defects and to check the wall thickness.

All castings shall be identified by stamped or cast-on reference marks which shall be entered on all relevant documents and test certificates.
The Employer/Engineer may require that certain castings shall be examined using radiographic techniques. The CONTRACTOR shall include for this eventuality and shall comply with the Employer/Engineer's instructions when issued.
Castings for code pressure equipment shall comply with all relevant rules from ASME and ASTM standards (material composition, testing, marking, traceability, etc.).

5.3 Cast Iron Castings

Cast iron shall not be used for any part of equipment which is in tension or which is subjected to impact, or to a working temperature exceeding 100 C unless specifically approved by the Employer/Engineer.
Cast Iron is not permitted on pressure equipment. Use of cast iron should be avoided due to the environment containing H_2S.
Materials for iron casting shall comply with the following specifications according to the following Standards: BS EN 1561, BS EN 1562, BS EN 1563, BS EN 13835 and BS EN 10027 or the equivalent other national standards,

e.g. British or European standards.
Weldable grades of Ni-resist austenitic cast iron castings may be repaired by welding provided the approval of the Employer/Engineer is first obtained. The CONTRACTOR shall submit full details of the proposed weld repair procedure and welding procedure qualification test prior to making any weld repairs.
Weld repairs will only be permitted if a casting defect is within the criteria, shown under item 5.2.
Test blocks shall be integrally cast on all medium and large castings.
The Employer/Engineer may require that certain castings shall be checked using radiographic techniques. The CONTRACTOR shall include for this eventuality and shall comply with Employer/Engineer's instructions when issued.

5.4 Aluminum Bronze Castings

Aluminum Bronze is only permitted where not exposed to geothermal fluid or the environment.
The CONTRACTOR shall prepare material purchasing specifications for all important aluminium bronze castings. Each document shall indicate fully the quality and inspection requirements for the component casting covered. Copies of the specification shall be issued to the Employer/Engineer for use. The inspection and quality requirements shall include an analysis of each cast, mechanical testing of test bars from each cast, pressure testing, penetrant flaw detection and radiographic examination of selected critical areas.
Weldable grades of aluminium bronze may be repaired by welding provided the approval of the Employer/Engineer is first obtained. The CONTRACTOR shall submit full details of the proposed weld repair procedure and welding procedure qualification test prior to making any weld repairs. On completion of repairs, welded areas shall be ground smooth and carefully blended into the parent material. The repaired areas shall be examined for defects using penetrant flaw detection and radiography. Crack- like linear defects shall not be permitted.
Weld repairs will only be permitted if a casting defect is within the criteria, shown under item 5.2.

6. WELDING GENERAL REQUIREMENTS

6.1General

All welding, inspection and testing of welds and welders shall be carried out in accordance with the applicable American, European, British and German Standard specifications (AWS, BS-EN, BS, DIN, AD-HP) as required by the design conditions of the plant and equipment and agreed by the Employer/Engineer.
For geothermal piping, the design code shall be ASME B31.1 and all welding shall be in accordance with ASME Codes.
Where there is conflict between Codes and/or Standards the Engineer's decision will prevail.
The CONTRACTOR shall supply all necessary plant, labour, equipment, appliances, materials and consumables required to perform all operations in connection with the welding within the limits of this contracts. All equipment, plant and appliances shall be good quality, well maintained and entirely suitable for the intended purpose.

6.2 General Fabrication

The Employer/Engineer shall be notified at least two days prior to commencement of any assembly or fabrication work on site.
The CO_2 and flux-cored welding process will not be acceptable for site welding unless otherwise approved by the Employer/Engineer.
Welders and weldings shall be protected by suitable equipment from wind, airborne sand and moisture. Work shall not be performed when weather conditions do not permit satisfactory workmanship or adequate inspection.
Weld preparation profiles may be prepared by machining, shearing, flame cutting and grinding and shall be performed carefully and accurately. Flame cutting is prohibited for stainless steel and high alloyed steel (>5% alloy quality). Whenever possible a mechanically guided tool shall be used for flame cutting.
All edges shall be left free of slag, burrs, fins, oxides and foreign matter and the finished profile shall conform to the design tolerances for the weld preparation.
Before execution of the welds, the profile shall be completely clean that means dry, free of any kind of humidity, slag, oxides, paint etc.
Where preheating is required it shall whenever practical be carried out by electric resistance or induction equipment or by specially shaped gas burners. Preheat and interpass temperatures shall be checked by temperature indicating crayons at a distance of not less than 75 mm from the weld groove. The use of hand-held torches for preheating will not be permitted.
Post weld heat treatment in accordance with the applicable European, British and American Standards shall be carried out using equipment specifically designed for the process. Gas burners or hand held torches will not be permitted. For work which is heat treated in a furnace, the CONTRACTOR shall supply copies of the heat treatment charts. Work which is subjected to heat treatments by means of electrically heated elements shall be monitored by suitable thermo-couplers (minimum two thermocouples) connected to a chart recorder.

Copies of heat treatment charts shall be made available to the Employer/Engineer.

While post-weld heat treatment, the pipes shall be extremely supported to ensure that no stress is coming on the weld.
All post weld heat treatments shall be carried out under the supervision of qualified personnel.
All transition welds between dis-similar materials shall be made under controlled conditions at the manufacturer's work.
Site welding of structural high yield steel will not be permitted without the prior consent of the Employer/Engineer.
All tube butt welds shall have 100% penetration. The surface of the finished weld shall not be concave.
Stainless steel shall be welded under a local inert atmosphere, including gas backing.
All stainless steel welds shall be cleaned and passivated.

6.3 Weld Alignment
Alignment of Welded Joints Unless detailed in the pressure equipment code each joint shall be aligned so that the offset between the internal surfaces does not exceed the following:

< 10mm wall;	± 1.00mm
> 10mm and <13mm wall;	± 1.25mm
> 13mm wall;	± 2.00mm

Wherever possible line-up clamps shall be used for aligning pipe ends. Line- up clamps shall remain in position until completion of the root pass.
On no account shall strips, plate sections or cleats be attached to the pipe for alignment purposes unless approved in writing, by Employer. Where fittings prevent the use of line up clamps, the work shall be set up, properly spaced and supported, and tack welded.

6.4 Welding Procedure Documents
Complete and fully detailed welding procedure documents shall be kept and these shall be made available to the Employer/Engineer on request.
Prior to the commencement of welding the CONTRACTOR shall submit to the Employer/Engineer for approval the welding procedures to be used in the fabrication of the relevant sections of work.
The welding procedure documents shall be fully detailed and each shall indicate clearly which item it is intended to cover. The procedures shall be in accordance with the requirements of ASME IX.
Welding procedure sheets for different materials of piping and valves shall be specified in appropriate sections of Instruction Manuals.

6.5 Welding Procedure Qualification Tests
Welding procedure qualification tests shall be carried out in accordance with the requirements of ASME IX or agreed National Standard for the item of plant under consideration. Providing that the CONTRACTOR confirms that the basic parameters of the procedure have not been changed since approval, the results of welding procedure qualification tests previously carried out under the Supervision of any internationally recognized inspecting authority may be accepted by the Employer/Engineer.
The CONTRACTOR shall inform the Employer/Engineer of any proposed changes to the welding procedures before such changes are implemented. If in the opinion of the Engineer a further qualification test is required as a result of such changes, than the CONTRACTOR shall perform the required test without additional charge. The results of all tests shall be made available, for examination by the Employer/Engineer, if required.

6.6 Welders Qualification Tests
All welder's and welding operators shall be qualified for the work and shall hold current welder's qualification certificates in accordance with ASME IX or agreed National Standard for the work.
All welders' tests shall be witnessed and/or approved by the Employer/Engineer before the welder or operator is permitted to work. The decision of the Engineer regarding the acceptability of any test or existing qualification tests shall be accepted solely at the discretion of the Engineer.
A welder or welding operator who fails one or more of the tests shall be retested after further training. Before retest, CONTRACTOR should confirm that the failed welder or welding operator has had further training and practice.
Records showing the date and results of the qualification tests performed by each welder and weld operator together with the identification number assigned to him shall at all times be available for scrutiny by the Employer/Engineer. The detailed welder's summary list shall be submitted to the Employer/Engineer at agreed intervals of time regularly.
All welding shall be carried out under the supervision of competent welding supervisors.

6.7 Storage of Welding Consumables

Welding consumables shall be stored in a manner that will protect them from all forms of deterioration prior to use and shall be properly identified.

Each batch of electrodes and wires shall be identifiable with the respective manufacturer's test certificate and advice note and shall be used in strict delivery rotation.

Electrodes which have damaged flux coatings are bent, misshapen or have lost their identification shall not be issued on any work.

The CONTRACTOR shall provide drying ovens in sufficient number to permit the correct storage of electrodes for 48 hours before use. Drying ovens shall preferably be heated by electric means and shall have automatic heat controls and visual temperature indication.

The re-baking of low hydrogen electrodes shall be done strictly in accordance with the manufacturer's recommendations.

The procedure for the issue of electrodes shall be carefully controlled. No welder shall be issued with more electrodes than can be used during a ½ day work period.

As far as necessary, all electrodes shall be issued and transported to the work place in thermally insulated containers. The electrodes shall remain in the container until they are required.

Gas cylinders for use with burning or welding equipment shall be marked in accordance with the requirements of ISO 13769. Site storage procedures for gas cylinders will require the approval of the Employer/Engineer.

6.8 Welding Equipment

Any welding equipment which, in the opinion of the Engineer is unsuitable or unsatisfactory for the service for which it is being used, shall be replaced by the CONTRACTOR.

The absence of comment by the Employer/Engineer shall not be taken as approval for any equipment.

6.9 Weld Examination

All non-destructive examinations shall be supervised by a fully qualified and experienced specialist appointed by the CONTRACTOR. Individual operators in each of the respective techniques shall be qualified and trained in the respective subject and shall have reached a standard comparable with CSWIP.

Testing shall be in accordance with the requirements of ASME B31.1 for geothermal piping and to the standards under ISO/TC44/SC5 for other metallic joints or equivalent standards as agreed by Employer/Engineer.

6.9.1 Visual weld inspection

Each weld shall be subjected to a stringent visual inspection and shall be free from undercut, excessive spatter, craters, cracks, porosity and other surface imperfections. Welds shall be of regular contour, even weld ripple and indicative of good workmanship.

Fillet welds shall be checked for dimensional tolerance and form using a fillet weld gauge. Fillet welds should be slightly concave in form and each leg of the weld shall have equal length.

6.9.2 Radiography

a. General

Radiography shall be carried out in accordance with the requirements and recommendations of ASME V Art. 2 for pressure equipment designed to ASME codes or recognized standards as agreed by the Employer/Engineer for all other items.

b. Manufacturer's works

Radiographic inspection at manufacturer's work shall be accomplished with X-ray equipment throughout.

c. Site

Gamma radiography will be permitted in appropriate cases at the job site. Cobalt 60 sources shall not be used without the express permission of the Employer/Engineer in writing.

d. Techniques

Radiographic techniques shall be in accordance with ASME V Art. 2 for pressure equipment designed to ASME codes or recognized standards as agreed by the Employer/Engineer for all other items.

The CONTRACTOR shall take all possible steps to protect radiographic and all other personnel from the effects of ionizing radiation.

6.9.3 Ultrasonic examination

Ultrasonic examination of welds shall be carried out in accordance with ASME V Art. 4 for pressure equipment designed to ASME codes or recognized standards as agreed by the Employer/Engineer for all other items.

6.9.4 Magnetic crack detection

Magnetic crack detection shall be carried out in accordance with ASME V Art. 7 for pressure equipment designed to ASME

codes or recognized standards as agreed by the Employer/Engineer for all other items.

6.9.5 Dye penetrant tests

Dye penetrant tests shall be in accordance with ASME V Art. 6 for pressure equipment designed to ASME codes or recognized standards as agreed by the Employer/Engineer for all other items.

6.9.6 Quality requirements for welds

All welds subjected to non-destructive tests shall be entirely free from cracks or crack like defects, lack of root fusion, lack of sidewall fusion, root bum through, or tailed pores. The standard for porosity and slag inclusions will be as indicated in the agreed standards for design and welding.

Personnel who perform non-destructive examination of welds shall have qualified and certified in each examination method in accordance to that standard, which is used for the welding and examination processes.

6.9.7 Mandatory inspections

A minimum of 25% of all butt welds on all classifications of work shall be radio graphically examined, unless otherwise agreed with the Employer/Engineer.

In addition to the minimum of 25% examination, all transmission welds between dissimilar materials, such as high alloy steels to carbon steel, or austenitic steels or non-ferrous materials to steels, shall be subjected to 100% ultrasonic examination or crack detection wherever practicable. In addition, all butt welds between dissimilar materials shall be subjected to 100% radiographic examination.

Also, all welds in ferritic alloy steels, e.g. having a carbon equivalent value in excess of 0.40% and high yield-strength steels, e.g. having a yield strength greater than 300 MPa, shall be subjected to 100% ultrasonic examination and crack detection wherever possible. In addition, all butt welds in these materials shall be subjected to 100% radiographic examination.

A minimum of 10% of all fillet welds on all classifications of work shall be examined by magnetic crack or dye penetrant tests, unless otherwise agreed with the Employer/Engineer.

The minimum weld examination shall be spread to all welders, that approximately 10% of each person's welds are tested.

For pressure vessels, all pressure retaining welds shall be 100% radiographed. All other welds shall be either magnetic particle or dye penetrant tested.

Radiographic tests shall be done after stress relieving according to the Standards and Codes.

In any case Non-destructive, i.e. radiographic tests, at site shall not be less than the following:

100% / 25%	100% NDT on cross welds and 25% NDT on all other welds for all two phase, steam, brine, and condensate lines.
25%	Minimum for all cold water lines, compressed air and other non-inflammable gas lines having a maximum operating pressure above 5 bar
10%	Minimum for all cold water lines, compressed air and other non-inflammable gas lines having a maximum operating pressure below 5 bar

- For further details on non-destructive testing, see section for "Inspection and Testing".

6.9.8 Weld repairs

The Employer/Engineer's approval shall be obtained prior to commencement of any repair or rectification work.

Weld repairs shall be made to the same procedure as for the original weld. All tests shall be repeated after the repair has been completed and reports on radiographic and ultrasonic tests shall be marked to indicate that the report refers to a repaired weld.

7. PUMPS

Pumps should be of the centrifugal type unless technical or strong economic reasons dictate that a positive displacement pump, either rotary or reciprocating, is more appropriate.

All pumps shall be designed for continuous operation unless otherwise specified.

"Monoblock" pump - motor configuration shall not be used anywhere. Pumps shall be installed in positions convenient for operation and servicing.

Where multiple pump installations are required, each pump and its associated equipment shall be arranged in such a manner as to permit easy access for operation, maintenance and pump removal without interrupting plant operation.
If several pumps are used for the same pumping work, these shall be of the same design i.e. interchangeable. Standard pumps with suitable characteristics shall be used wherever practical. Only proven makes and models shall be supplied. All accessories and the overall design of the pumps sets shall be such that they are suitable for automation as planned for the relevant systems.
Unless otherwise specified all pumps shall be capable of operating at 110% of the rated capacity at the rated delivery head. Maximum size impellers shall not be quoted for. By installation of a new impeller a head increase of
5% minimum shall be possible. The performance of the drive motor is to be determined according to the above mentioned technical requirements and to the requirements as specified in the electrical part.
Base plate for pumps/pump skids which handle sea water/brine or any other corrosive fluid shall be of the same material as the pump or at least stainless steel 316L quality (to be approved by the Employer/Engineer).

7.1 General Requirements of Centrifugal Pumps
Maintenance time should be minimized by the selection of appropriate designs of pump, preferably those that leave casing to piping joints intact, i.e. horizontal split-casing types for large centrifugal pumps and horizontal, back pull-out types for smaller units. Where a significant saving in floor space or improvement of layout can be shown, a vertical pump may be acceptable.
Generally fabricated components for pump parts such as impeller, shaft, etc. are not acceptable.
Pumps shall be capable of continuous operating with minimum maintenance. The rating of the driver and the pump's NPSH requirements shall be such that the pump is capable of a flow rate 10% in excess of the maximum flow rate required. In addition pumps shall be designed to have a reasonable margin on head (normally 5% on head for clean fluids, 10% for solids- bearing fluids) to compensate for normal wear of pump components. There shall be an adequate margin on NPSH, normally greater than 1 m for values of NPSH (required) between 2 m and 12 m with flow rates up to the stated maximum.

Where any pumps are installed to operate in parallel, they shall be capable of equal load sharing throughout the operating range. This implies a pump head flow characteristic that falls continuously from shutoff to duty point by at least 10%.
The pump unit shall, when operating over its normal range of flow rates, comply with the noise emission requirements stated in clause 1.6.
If a pump can operate at sub-atmospheric suction conditions, the entire pump shall be designed for full vacuum.
All pump shafts shall be of optimum size to transmit the maximum possible output from the prime mover. The pump shaft and coupling are to be so dimensioned that the maximum permissible torque of the shaft is higher than the maximum transmissible torque of the coupling. Directly coupled pumps shall be used preferably.
All pump-motor units shall be installed on substantial base plates, with isolating valves, a discharge non-return valve, air release valves (for both pump casing and seal chamber), drain valves, suction and discharge pressure gauges unless otherwise stated. The supplier should review the minimum flow rates and supply a leak-off system, if necessary, in which case all minimum flow detection devices, diversion valves and pipe work shall be supplied. The extent of supply shall include adequate spare parts for commissioning purposes and a first fill of all lubricants.
All pumps and accessories in contact with the pumped fluid shall be constructed of materials specifically designed for the conditions and nature of the pumped fluid, and be resistant to erosion and corrosion.
Where material specifications are given in the various pump specification, these are to be considered as minimum requirements. They do not relieve the
CONTRACTOR of the responsibility for selecting the correct materials. All mating flanges shall be doweled. Only stainless steel shims shall be used. No corrodible material for embedded supports shall be used.
The pump casing shall preferably be split for ease of maintenance and be designed such that the impeller and shaft are capable of being withdrawn from the casing without disturbing any of the main pipe work and valves carrying the pumped fluid. In general, all horizontal pumps with draw out-rotors are to be fitted with a coupling to facilitate disassembly without removing the motor.

Vertical pumps are to be provided with foundation frames. In case of submersible pumps suitable frames shall be provided in the pump sump. It shall however be possible to remove these pumps without entering the sump.

7.2 Technical Requirements of Centrifugal Pumps
In selecting bearing type, account should be taken of possible vibration damage to the bearing surfaces while the machine is stationary. Where sleeve bearings are used, bearing shells shall be replaceable without removing pump or motor shaft. Bearing housings shall be effectively sealed against loss of lubricant and ingress of fluid or dirt.
All oil lubricated bearings shall have housings fitted with means of drainage, visual oil level indicator and a capped filler or a constant level oiler which is accessible whilst the unit is operating. Grease lubricated bearings shall be connected to

readily accessible greasing points either singly or at a battery plate. Lubrication should be by means of a pressure gun.

Bearings housings on horizontal shaft pumps shall be designed to enable the bearings to be replaced without removing the pump or motor from its mounting. All bearing oil wells shall be fitted with visual oil level indicators. Non-pressure-oil lubricated bearings shall be equipped with constant level oilers. Means of draining bearing housings shall be provided.
Where rolling contact bearings are used, they shall be sized to provide a minimum L-10 life of 16,000 hours (as per ISO 281) under conditions of maximum load on the bearings. In the case of a close-coupled pump, this requirement applies to the motor bearings.
For fully closed impellers replaceable case wear rings shall be fitted where diameters exceed 150mm and replaceable impeller neck rings where diameters exceed 250mm. All wear rings shall be a press fit on or in their respective component and positively locked against rotation.
Fully closed impellers are not required for vertically suspended pumps.
Casing design pressure shall be at least 1.1 times the pump shut-valve pressure with the pump operating at maximum possible inlet pressure. The pump casing and base plate shall be capable of withstanding all hydraulic forces, together with externally applied pipe moments and loads and the supplier shall state the pump's pipe load limitations.
The pump unit and all removable components greater than 10kg in weight shall be fitted with suitable lifting lugs and eyes to facilitate all erection and maintenance tasks. Any special lifting tackle shall be supplied.
Suitable means, such as jacking screws, shall be provided to aid the separation of pump components; these shall be arranged so that no damage can be done to mating or sealing faces by their use.
The method of fitting impeller to the shaft shall adequately centre the component but allow its removal without risk of damage to either component. Torque shall be transmitted to the impeller by keying, other than in the case of a multistage vertical pump for which collet drive may be acceptable. The main impeller nut or screw shall not have its thread exposed to the pumped fluid and must either be locked or maintained tight by virtue of the normal direction of rotation.
The pump shafts shall be designed such that the first critical speed of the pump is at least 20% higher than the maximum speed encountered in service.
All rotating components shall be dynamically balanced, to grade G6.3 of ISO 1940-1.
Where two pumps are connected in parallel, the units shall be capable of reverse rotation under full pump head without sustaining any damage.
When the pump (above 200 kW) is operating over its normal flow range, the vibration intensity measured at the bearing housings shall not exceed the level as defined within ISO 10816-7 (3.5mm/s for category I, 4.2mm/s for category II).
For small machines (i.e., less than 200 kW driver rating) vibration intensity shall not exceed 2.5mm/s for category I and 3.2mm/s for category II.
Pumps shall operate smoothly throughout the speed range up to their operating speeds.
Where necessary the pumps are to be fitted with devices to ensure a minimum throughput.

7.3 Shafts, Seals and Couplings

All pumps shall be installed with isolating valves, a non-return valve and suction and discharge pressure gauges unless otherwise stated.
All pumps other than submersible pumps shall have temporary strainers fitted in the suction pipe work during all initial running and commissioning. Permanent strainers shall be provided where specified.
Venting valves shall be fitted to all pumps at suitable points on the pump casing unless the pump is self-venting.
Drainage facilities shall be provided on the pump casing or adjacent pipe work to facilitate the dismantling of pumps. Pipes for leakage water, venting, draining etc. are to be routed to a funnel at the edge of the base plates.
Air release valves shall be fitted at suitable point of pump casing where appropriate for the process fluid.
Packed glands if not otherwise specified shall be used for pumps handling cold water and other non-hazardous liquids.
Clean water sealing arrangements shall be provided for gland packing of pumps handling geothermal brine or condensate, if recommended by the pump vendor to ensure longevity of the pump seal.
Mechanical seals shall be preferably of a pressure-balanced type. The design of the unit should allow the mechanical seal to be replaced without disturbing the pump or driver if practicable.

Mechanical seal shall be fitted over a sleeve on shaft. The mechanical seal shall be of the split type to facilitate quick removal/replacement without any disassembly of other parts of the pump.
All pump glands shall be provided with trays and guards to catch leakage. Piping shall be fitted for drainage to an approved location.
Couplings shall be dynamically balanced to ISO 1940-1 G 6.3 where speed exceeds 1800 rpm or shaft diameter exceeds 51 mm. Dynamically balanced couplings shall be match marked. Where a spacer coupling is used, the spacer shall similarly comply.
All coupling and any intermediate shafts shall be fully guarded.

7.4 Pump Materials

Materials of constructions shall be selected with due regard to the corrosive nature of the pumped fluid and risk of corrosion, cavitation, and metal-to- metal galling that can occur within a pump in all its modes of operation. It is the supplier's responsibility to select materials that will provide an adequate service life.

If the pump impeller and impeller shaft are of different material, any portion of the impeller shaft which could be in contact with the water must be encased in a protection sleeve of the same material as the impeller. All materials shall be selected with particular regard for the risk of electrochemical corrosion.

Cast iron is not acceptable for pump cases where the duty involves shock loads or where service stresses exceed 10% of the Ultimate Tensile Strength in tension or 15 % in bending. This restriction does not apply to castings of spheroidal graphite structure with an elongation greater than 10%.

Materials for handling foul water are not specified above and will depend on detailed water chemistry.

8. PIPEWORK

8.1 General

Piping and valves shall comply with the latest revision of the applicable codes and standards (latest revisions) such as DIN, EN, ASME or other equivalent international standards. Standard pipe sizes shall preferably be according to ISO 6708 or ASME B36.10M/ B36.19M.

Geothermal piping design, construction and testing shall comply with ASME B31.1.

The pipe and fittings shall be manufactured by an ASTM or API approved facility. This certification shall be current and documentation supporting the approval shall be made available to the Employer on request.

Materials and Mill certification for all pressure pipes and fittings shall be supplied to the Employer. Test certificates shall be provided with the following:

- Heat analyses
- Mill control tensile tests
- Hydrostatic tests
- Quality assurance inspections

The test certificates shall be clearly identifiable with the items supplied. Four copies shall be supplied.

All documents shall be clearly legible and suitable for photocopying.

All units shall be SI units except for nominal pipe diameter which may be in inches Pipe shall be manufactured to the specified codes with the specified wall schedule.

When the pipe is specified Electric Resistance Welded (ERW) type, it may be substituted by Seamless (SMLS) or Electric Fusion Welded (EFW) type, with higher welding efficiency, in accordance with the above standards. EFW type may be substituted by SMLS but not ERW type. SMLS pipes shall not be substituted unless accepted by the Employer

All metallic piping DN 50 and larger shall be butt weld. Smaller piping shall be socket weld except where threaded joints are specifically required in certain instances in the piping material class.

Seal welding of threaded connections is only allowed at hydrostatic test vents, or where specified on drawings.

Before placing the next construction layer or applying prime coat, the road base shall be mechanically swept, then cleaned with compressed air to remove loose material. As soon as possible after cleaning of the surface, the road base shall be sealed by the application of a prime coat as specified. Should the surface of the material be allowed to dry out before the seal is applied, it shall be lightly watered and re-compacted immediately prior to spraying with prime coat. Should the full depth of layer be allowed to dry out, it shall be removed and replaced, at the CONTRACTOR’s expense, with fresh material. Watering and re-mixing in place will not be permitted.

9.0 ENVIRONMENTAL RESTORATION AND WELL PAD FENCING

9. 1. Environmental Restoration

All disturbed area MUST be restored as much as possible to the way they were before excavation and installation works of connecting the makeup wells. The restoration will involve the following activities:

- Preparation of affected grounds and planting of grass specified by the Employer.
- Installation of gabions by use of back filling, use of stones bound in standard gauge chain links.
- Drainage of condensate and any storm water from the installed works.

9.2 Fencing of well pads

Fencing will be as per specifications approved by the employer. The contractor shall provide drawings to be approved by the employer/engineer

PART F : CORROSION PROTECTION AND PAINTING

1.0 S C O P E

The intent of this Part of the requirements is to define surface preparation, protective coatings and paint systems to be applied on vessels, equipment, piping and structures.

This Part of the requirements shall be used as a basis for the preparation of painting schedules, engineering drawings and requisitions of materials and labour and for demanding site space for the surface preparation and execution of the painting works.

This Part of the requirements covers the general requirements for painting work of the project. This part of the requirements further outlines the type of paint, surface preparation, touch up for prime coat(s), number of prime and finish coats, dry film thicknesses for any item requiring painting in the project.

The CONTRACTOR shall furnish all labour, materials and equipment, including paints and thinners of the best quality and made available also to every subcontractor. The paints shall be supplied by a paint manufacturer with international experience and internationally available products. Only experienced personnel shall apply paints.

The proposed methods shall be in accordance with the best engineering practice and to the approval of the Employer/Engineer.

1.1 System Description

This part of Employer's requirements covers the requirements for painting, surface preparation, as well as the application of protective coatings for structural steel, equipment, piping, tanks, etc. for the entire plant.

After the Contract has been awarded, the CONTRACTOR shall submit a painting and coating schedule along with a quality assurance program for the Employer/Engineer's review.

1.2 Codes & Standards

Latest editions of the following Standards shall guide this part of Employer's requirements:

- This coating requirements
- ISO 8501-1 / ISO 8503
- ASTM D 2200
- SSPC (Steel Structures' Painting Council)
- Standards
- DIN 55928 Standards
- BS 4479 Standards
- DIN 2403 Standards
- ISO 12944 Standards

1.3 Quality Control and Inspection

Quality control and inspection by the EMPLOYER will not release the CONTRACTOR from his responsibility for the correct performance of the work.

For quality control and inspection the following instruments and standards shall be provided in satisfactory working conditions:

- ISO 8501-1 (Pictorial Reference)
- Keane Tator /Rugotest No. 3 or ISO comparator (ISO 8503)
- Material thermometer
- Surface temperature gauge
- Sling psychrometer
- Non-destructive dry film thickness gauge
- Wet-film thickness gauge
- Non-destructive pinhole detector (for tank linings and immersed surfaces)

The CONTRACTOR shall bear full responsibility for the application of coatings, applied by him on surfaces, primed or painted by others. Covers shall be used where required to protect building structures, equipment, insulation and lagging. When surfaces have been stained or otherwise damaged by the painting and/or surface preparation work, the CONTRACTOR is responsible to thoroughly clean and/or repair these surfaces. Parts which cannot be coated and which are very sensitive to atmospheric exposure must be efficiently packed for storage. The inside of equipment and machinery shall be cleaned thoroughly at works, and before transportation all holes and access openings shall be efficiently sealed in order to prevent infiltration of dirt and humidity.

Treated and machined parts not to be painted shall receive a provisional corrosion protection.

Unless otherwise specifically indicated in the particular requirements, surfaces, such as stainless steel, brass, copper or any other non-ferrous items, finished hardware, etc. shall not be painted.

Note: Structural bolts shall be galvanized, and painted as specified under painting systems for carbon steel surfaces.

1.4 Guarantees

The guarantee period for the complete painting and corrosion protection shall amount to five (5) years after the EMPLOYER's final inspection and acceptance. Necessary minor maintenance/touch-up only shall be conducted by the EMPLOYER during the warranty period.

For defining a possible failure of corrosion protection the standards of the European scale for degree of rusting of anticorrosive paints shall be used. A standard of Re 3 after a five (5) years' period is accepted. If the degree of corrosion is above this standard the CONTRACTOR shall be responsible for repairing and/or repainting those areas that failed.

2.0 DESIGN CRITERIA

2.1 Protective Coatings and Paint Systems

Type and number of protective coatings for any item which requires corrosion protection on this project shall be in accordance with these coating requirements.

The intention of the coating requirements is to protect all parts which require corrosion protection with a prime coat which should be applied at supplier's works. Only touch-up of bolts, welds and damaged areas will be required for field priming of these items.

For parts which are not likely to be damaged during transportation, the EMPLOYER may give the approval to apply the full number of coats for these parts in the shop.

2.2 Conditions for Painting

In general, coatings shall not be applied when the temperature of the steel is below + 5°C.

Surface temperature must be at least + 3°C above the dew point to ensure that condensation does not occur on the surface. In order to prevent condensation on the steel surface, the relative humidity must be checked continuously.

In hot climates coating materials should not be applied if the steel temperature is above + 50°C.

No coating should be executed during sand storms and rain. Care must be taken:

- To guard against the influence of the marine atmosphere e.g. by applying the coating by a spraying process using a flame for drying the surface and immediate coat application.
- not to paint outdoor parts prior to rain,
- to attain the specified dry film thickness in hot weather,
- to let prime coats exposed to excessive humidity, rain etc. dry and then remove the damaged coats, and then prepare the surface anew and prime again,
- To apply an additional top coat on any sheltered and/or unventilated horizontal surface on which dew may collect.

If more stringent, the coating supplier's recommendations shall supersede the above. Special exceptions for applications at higher or lower temperatures are possible if approved by coating supplier.

2.3 Safety Precautions

All necessary precautions shall be taken by the CONTRACTOR to protect personnel and property from hazards due to falls, injuries, toxic fumes, fires, explosion or other harm.

All painting and corrosion protection work, including the inside of buildings and vessels, shall be performed under strict safety conditions.

The CONTRACTOR shall be responsible for adequate ventilation, protection from open flames, sparks and excessive heat, by taking into consideration the high temperatures prevailing especially during summer. The areas where this work is performed shall be clearly marked with warning signboards.

The CONTRACTOR is responsible to ensure that all work to be done and all equipment used is in accordance with the local authority regulations. The CONTRACTOR shall also follow the safety regulations of the relevant local or plant safety department.

2.4 Surface Preparation

The life of a coating system depends primarily on surface preparation. Therefore, the CONTRACTOR should precisely follow the degree of specified surface preparation in this part of the requirements.
Any contaminants must be removed from the surface to assure good wetting of it by the primer and its good adherence. (No loose paint, dirt, grease, rust, scale, weld slag, spatter must be left; oil, grease, soil, cement, salts, acids, corrosive chemicals must be removed by solvents, emulsions or cleaning compounds leaving no detrimental residues; newly formed rust must be removed in the specified manner; sharp edges must be rounded off, especially if linings are to be applied; machined surfaces must be protected against further contamination; no blast cleaned surfaces are to be left uncoated overnight, and all cleaned metallic surfaces shall be coated as soon as possible; workshop protected steelwork must be cleaned of contaminants and damage to shop primed components during transport shall be rectified by blast cleaning, restoring the specified grade of surface preparation and protected by touch up; wood surfaces shall be sanded clean, all nail holes shall be puttied and sanded before priming.)
The surface preparation has to meet all requirements of the standards stated above and of the manufacturer and applicant of the coatings who are guaranteeing the quality of the coatings.

2.4.1 Steel

The surface preparation of this part of the requirements shall be governed by ISO 8501-1. Reference to other International specifications on surface preparation is made below:

Surface Preparation Grades			
ISO 8501-1	DIN 55928 / 01-70	SSPC-VIS 1 ASTM- D 2200	NACE TM
Sa 1 - Light blast cleaning	Sa 1	SP 7	No 4
Sa 2 - Thorough blast cleaning	Sa 2	SP 6	No 3
Sa 2½ - Very thorough blast cleaning	Sa 2½	SP 10	No 2
Sa 3 - Blast cleaning to pure metal	Sa 3	SP 5	No 1

The abrasives used for blast cleaning shall be grit, shot, graded flit or silica sand (where allowed) and shall be such that they will produce an average anchor pattern of 25-50 µm.
After blast cleaning all accumulated blasting material, dust etc. must be removed, leaving a surface which is clean, dry and free of mill scale, rust, grease and other contaminants.
The blasted steel shall be primed as specified in the requirements immediately after blasting and cleaning to avoid rusting.
Before field touch-up, all surfaces to be touched-up, such as boltings, weldings and unprimed plates shall be cleaned from all rust, scale, welding contaminants, grease, oil and other foreign matters. Damaged primer shall be removed from welded or defective areas until sound primer is encountered.
Surfaces that have been coated, but are not meeting the standards of this part of the requirements, shall be re-blasted and coated at the CONTRACTOR's expenses.

2.4.2 Galvanized surfaces

Galvanized surfaces shall be cleaned by emulsifier and fresh water to remove oil. After that the surface shall be etched or roughened in accordance with the coating manufacturer's recommendation.

2.5 Coating Material and Application

The CONTRACTOR shall use only coating materials that meet the requirement of this part of the requirements.
Unless otherwise accepted, all field coats of a system must be products of one manufacturer.

2.5.1 Preparation & application of coating materials

Preparation and application of coating materials shall meet all requirements of the standards listed in paragraph 1.2 as well as the specific requirements as stipulated in the relevant paragraphs of chapter 3.
Care shall be taken:

- not to use livered, gelled or otherwise deteriorated paints or coating materials,
- to use the oldest coating of each kind first,
- not to open the paint containers until required for use,
- to mix all paints before and agitate thoroughly during use, to keep the ingredients in suspension
- not to transfer a paint or a primer from the container before all settled ingredients have been suspended,
- to mix open containers and/or to add thinners in a well-ventilated area only and in a way ensuring complete dispersion and suspension of all ingredients
- to mix two component primers and coatings strictly according to the data sheets of the manufacturer,

- not to add thinners to primers or paints unless necessary for proper application according to the manufacturer's data sheets, and to add only compatible thinners,
- to apply primer coatings by brush or airless or flame spray or a combination of these methods, as approved by the coating manufacturer,
- to paint all doors, windows, stairways, handrails (where painted), bottles, flanges and equipment supports by brush,
- not to use spray guns outdoors in windy weather or near unprotected
- surfaces of a contrasting colour,
- under no circumstances to use paint spray guns in areas where spray may be carried onto exposed electrical equipment,
- to do all cold spray painting using standard equipment in accordance with accepted industrial standards and methods
- to remove at the CONTRACTOR's expense, paint misplaced on items that are not to be painted, leaving the surface clean, unstained and undamaged,
- to allow each coat of paint to harden before the next is applied, to keep to a hardening time, as a rule, of 12-14 hours for epoxy paints,
- to follow suppliers' recommendations regarding hardening time for epoxy paints,
- to pay particular attention to full film thickness at edges,
- to keep overspray, skips, runs, sags and drips to a minimum,
- Not to have different coats of the same colours.
- to apply each coat as a continuous film of uniform thickness and free of pores as far as possible,
- to allow the concrete to cure prior to application of the required protective coating,
- To attain the minimum total dry film thickness (measured in microns =
- millionth part of a meter) of the paint systems as required in the
- Following "Paint System Schedules".

2.5.2 Protective coatings & paint systems

A colour scheme shall be established by the CONTRACTOR in co-operation with the Employer/Engineer.
The type and number of protective coats for any item requiring painting during the project shall be in accordance with the attached tables 'Paint System Schedules' and the Employer/Engineer's requirements.
Generally, all parts shall receive the specified prime coat(s) and sealing at the supplier's works to ensure that no corrosion occurs during transport to the site and storage in the corrosive climate at the site. Parts which cannot be damaged during transport shall receive the full number of coats in the workshop.

2.5.3 Galvanizing

Galvanizing work shall conform in all respects to German Standard DIN 55928, B.S. 729, B.S. 3083 and SB.S.C.P. 2008 and shall be performed by the hot dip process, unless specified otherwise.
All details of steel members and assemblies to be hot dip galvanized should be designed to suit the requirements of the process, in accordance with B.S. 4479 and DIN 55928. Care must be taken over:

- vent and drain holes
- careful cleaning of welds
- removal of all defects of the steel surface according to B.S. 4360
- structural steel grit blasted to Sa 2 1/2 or pickled,
- smooth galvanized coating, free from such gross surface imperfections as bare spots, lumps, blisters and inclusions
    - minimum weight of average coating, to be (see B.S. 729): on steel sections 5 mm thick and over 900 g/m^2 on steel sections 2.5 mm thick 600 g/m^2
    - galvanized contact surfaces of bolts, nuts and washers joined by high tensile friction grip bolts, roughened before assembly to the required slip factor (B.S. 3139, 3294, 4395, 4064), with the roughening confined to the area of the mating faces, to be hot dip galvanized and subsequently centrifuged (B.S. 729),
    - nuts shall be tapped up to 0.4 mm oversize after galvanizing and the threads oiled to permit the nuts to be finger turned on the bolt for the full depth of the nut with no lubricant applied to the projecting threads of a galvanized high tensile friction grip bolt after the bolt has been inserted through the steelwork, thus allowing for contact with the mating faces of the steelwork,
    - protected slings to be used for off-loading and erection,

- galvanized work stored at the works or on site to be stacked so as to provide adequate ventilation to all surfaces to avoid wet storage staining (white rust),
- restoration of small areas of the galvanized coating by: cleaning the area of any weld slag and thorough wire brushing to give a metallic clean surface followed by the application of two coats of zinc powder rich paint, or the application of a low melting point zinc alloy repair rod or powder to the damaged area, which is heated to 300° C,
- application of two coats of zinc rich paint on the fixed bolt heads, washers and nuts,
- Protection of connections between galvanized surfaces and copper, copper alloy or aluminium surfaces by suitable tape wrappings to the Employer/Engineer's approval.

1.5.4 Sprayed metal coatings

Corrosion protection can also be achieved by spraying aluminium, zinc, tin, copper, lead or other suitable metals onto the surfaces of structures. Composition of coating metals, methods of surface preparation and application of coatings, requirements for thickness and adhesion and subsequent treatment shall conform to B.S. 2569.

The requirements for sprayed, un-fused coatings of metals and metallic compounds applied by combustion gas flame, plasma arc, detonation and similar processes, and the preparation of components, spraying techniques, sealing, finishing and inspection are those of B.S. 4761.

2.5.5 Weathering steels

The requirements of Standards ASTM A 242, ASTM A 588 and DIN 17 100, DIN 55928 must be observed in the use of structural steel which is corrosion inhibited, so called weathering steel.

2.5.6 Pipelines

All pipelines shall be marked according to the medium transported in agreement with a colour code. The marking shall take the form of painting by executing the painted colour rings in suitable size and number.

The referred application method for the coating systems specified is by airless or conventional spray equipment. Where spray equipment is required, the equipment, adjustments and air pressure shall conform to the manufacturer's requirements.

Regarding storage of paint and coating material as well as mixing and application, the CONTRACTOR shall follow the application instructions of the coating manufacturer. The colours of the different coats shall differ sufficiently for control purposes.

The specified different dry-film thicknesses are minimum requirements. Therefore, sufficient wet film thickness per coat shall be applied to obtain the specified dry-film thickness after drying or curing. The CONTRACTOR shall follow the manufacturer's instructions and shall use wet film as well as dry-film thickness gauges.

Drying time between coats shall conform to the manufacturer's recommendations and shall be strictly followed.

A UV protection final coating using a polyurethane based painting is preferred.

3.0 DESIGN /ENGINEERING

3.1 Colour Schedule

After the award of the contract the colour schedule for the plant shall be compiled by the CONTRACTOR and submitted for approval to the EMPLOYER.

All pipe and equipment cladding shall be painted in a colour that blends the pipework into the environment. The colour and pattern shall be as close as possible to the green camouflage used on GDC geothermal pipelines at Menengai. The Contractor shall propose suitable colours and patterns for the Employer’s approval.

Pipes and valves shall be identified by painted bands of the identification colour for the fluid transported.

All identification colours shall be in accordance with RAL.

Flow direction arrows shall be painted in the vicinity of branching-off connections, at the inlet branch connections downstream of each valve and at points which will be indicated by the EMPLOYER on site.

All equipment and installations shall also be marked with identification numbers.

3.2 Galvanizing

For surfaces where galvanizing is specified, all galvanizing shall be carried out by the hot dip process, and unless otherwise specified shall conform in all respects to BS 729.

The detailed design of members shall be in accordance with BS 4479.

3.3 Painting Systems

The following painting requirements for different systems are valid for the different purposes as quoted in the headlines

and/or as detailed in the first paragraph of each requirement. Surfaces of structural steel and other related steel components shall be galvanized where specified. The steel surfaces mentioned in those first paragraphs below are meant to be applicable for surfaces, which are not specified as galvanized.
All steps for surface preparation, prime coating, finish coating have to be carried out at work. External bellows are made of stainless steel. No grease shall be used on bellows. Suitable corrosion protection will be provided. Details shall be verified during execution.

3.4 Carbon Steel Surfaces up to 100°C; Inside Buildings

3.4.1 Definition

- Environment corrosion category according to ISO 12944-2: C3
- Carbon steel surfaces, not insulated, indoors, such as structural steel, cranes, air ducts, pipes, condensers, tanks and vessels' exterior surfaces, valves and fittings.
- Temperatures up to 100°C.

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 2 ½
Prefabrication Primer-optional	Depending on production flow, a weldable organic zinc silicate shop-primer may be used. Dry film thickness 20 µm. Solids by volume min. 25%
Prime coat	Organic zinc silicate. Dry film thickness 50 µm. Solids by volume min. 58%

3.4.2 At Works

Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. De-rusting of all mechanical damages according to ISO 8501-1 Grade: ST3 Touch-up with organic zinc by volume content of not less than 75%. Dry-film thickness 50 µm
Intermediate coat	Epoxy Dry-film thickness 100 µm

3.4.3 At site

Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. De-rusting of all mechanical damages according to ISO 8501-1 Grade: ST3 Touch-up with organic zinc by volume content of not less than 75%. Dry-film thickness 50 µm
Intermediate coat	Epoxy Dry-film thickness 100 µm
Finish coat	Polyurethane top coat Dry-film thickness 50 µm as per colour code Solids by vol. min. 60% Total system minimum dry-film thickness 200 µm.

Note:
When airless spray application is not possible, 2 coats of epoxy polyamide cured finish can be applied by roller or brush

to achieve specified thickness.

3.5 Carbon Steel Surfaces up to 100°C; Outside Buildings

3.5.1 Definition

- Environment corrosion category according to ISO 12944-2: C4
- Carbon steel surfaces not insulated, outdoors, such as structural steel, jetty structures non-submerged, cranes, air ducts, pipes, condensers, tanks and vessels exterior surfaces, valves and fittings and other surfaces.
- Temperatures up to 100°C

3.5.2 At works

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 2 ½
Prefabrication Primer-optional	Depending on production flow, a weldable organic zinc silicate shop-primer Dry-film thickness 15 µm. Solids by volume min. 25%
Prime coat	Organic zinc silicate. Dry-film thickness 60 µm. Solids by volume min. 58%

3.5.3 At site

Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. De-rusting of all mechanical damages according to ISO 8501-1 Grade: ST3 Touch-up with organic zinc with solids by volume content of not less than 75%. Dry-film thickness 75-100 µm
Intermediate coat	Epoxy polyamide Dry-film thickness: 175-200 µm Solids by volume: min. 60%
Finish coat	Polyurethane top-coat Dry-film thickness: 50 µm as per colour code. Dry-film thickness for oil pipelines: 60 µm. Solids by vol. min. 44%

Total system minimum dry-film thickness 300 µm.
For oil pipelines: Total system minimum dry-film thickness 325 µm.

Note:
For areas where good colour and gloss retention is required, finish coat should be an aliphatic polyurethane - 50 µm - instead of epoxy; Solids by volume min. 45%.

3.6 Carbon Steel Surfaces up to 200°C

3.6.1 Definition

Carbon steel surfaces not insulated, indoors and outdoors, such as structural steel, pipes, condensers, tanks and vessels exterior surfaces, valves and fittings.
Temperatures 100°C up to 200°C

3.6.2 At works

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 2 ½
Prefabrication Primer-optional	Depending on production flow, a weldable inorganic ethyl zinc silicate shop-primer Dry-film thickness: 15-25 µm Solids by volume: min. 25%

Prime coat	Inorganic ethyl zinc silicate Dry-film thickness: 75 µm Solids by volume: min. 58%
Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. De-rusting of all mechanical damages according to ISO 8501-1 Grade: ST3 Touch-up with inorganic ethyl zinc silicate or silicone zinc primer, to restore original dry-film thickness.
Intermediate coat	Silicone-acrylic Dry-film thickness: 50 µm Solids by volume: min. 36%
Finish coat	Silicone-acrylic Dry-film thickness: 50 µm. Solids by vol.: min. 36%

3.6.3 At site

Total system minimum dry-film thickness 175 µm.

3.7 Carbon Steel Surfaces up to 400*°C*

3.7.1 Definition

- Carbon steel surfaces not insulated, indoors and outdoors, such as pipes, valves and fittings.
- Temperatures 200°C up to 400°C
- Temperatures above 400°C will not result in an immediate breakdown but will reduce the long term anti corrosive properties.

3.7.2 At works

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 3
Prefabrication - Primer-optional	Depending on production flow, a weldable inorganic ethyl zinc silicate shop-primer Dry-film thickness: 15-25 µm Solids by volume: min. 25%
Prime coat	Inorganic ethyl zinc silicate. Dry-film thickness: 75 µm Solids by volume: min. 58%
Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. De-rusting of all mechanical damages according to ISO 8501-1 Grade: SA3 Touch-up with inorganic ethyl zinc silicate or silicone zinc primer, to restore original dry- film thickness.
Intermediate coat	Silicone-aluminium Dry-film thickness: 20 µm
Finish coat	Silicone-aluminium Dry-film thickness: 20 µm.

3.7.3 At site

Total system minimum dry-film thickness 115 µm.

3.8 Steelwork Underground

3.8.1 Definition

- Water pipelines – outside surface, buried in the soil.
- Temperatures up to 60°C.

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 2 ½
Finish coat	Two coats of high solid glass flake epoxy coating, volume solids content not less than 91%. Dry-film thickness each of: 300 µm.

3.8.2 At works & at site

Total system minimum dry-film thickness 600 µm.

3.9 Galvanized Surfaces

3.9.1 Definition

- Galvanized surfaces, requiring paint finish according to the particular
- technical requirements, indoors and outdoors

Temperature up to 100°C

3.9.2 At site

Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. To obtain min. 25 µm anchor profile sweep blast surface. If sweep blasting is not practicable, the surface should be etched.
Prime coat	Epoxy polyamide Dry-film thickness: 50 µm Solids by volume: min. 47%
Finish coat	Epoxy polyamide Dry-film thickness: 100 µm Solids by volume: min. 60%

Total system minimum dry-film thickness: 150 µm.

Note:
For areas where high gloss finish is required, the finish coat should be aliphatic polyurethane - 50 µm - instead of epoxy.

3.10 Aluminium and Stainless Steel Surfaces

3.10.1 Definition

- Aluminium and stainless steel surfaces, requiring paint finish according to the particular requirements, unless otherwise specified in the particular requirements.
- Temperature up to 100°C

3.10.2 At site

Pre-treatment	Thorough cleaning to remove oil, grease, dirt and any other contaminants. To obtain min. 25 µm anchor profile sweep blast surface. If sweep blasting is not practicable, the surface should be etched.
Prime coat	Epoxy polyamide [1] Dry-film thickness: 50 µm Solids by volume: min. 47%
Finish coat	Epoxy polyamide [1] Dry-film thickness: 50 µm Solids by volume: min. 44%

[1] Free of chlorine and metallic zinc.
Total system minimum dry-film thickness: 100 µm.

Note:
For areas where good colour and gloss retention is required, the finish coat should be aliphatic polyurethane - 50 µm, instead of epoxy.

3.11 Mechanical Equipment

3.11.1 Definition

Equipment - such as pumps, motors, gearboxes, bearings, instrument panels, electrical cubicles, switchboards, control and relay panels, distribution boxes, transformers, turbines, generators.

3.11.2 At works

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 2 ½ Degreasing, rinsing, pickling or phosphating
Prime coat	Epoxy polyamide primer Dry-film thickness: 50 µm Solids by volume: min. 47%
Intermediate coat	Epoxy polyamide tie coat. Dry-film thickness: 50 µm. Solids by volume: min. 47%
Finish coat	Aliphatic polyurethane Dry-film thickness: 50 µm. Solids by volume: min. 45%

Total system dry-film thickness: 150 µm.

Note:
Equipment supplied with manufacturer's standard can be approved if the quality of the coating system meets the quality of above system.
If this system does not receive approval, a self-priming high build epoxy shall be used as a tie coat.

3.12 Cathodic Protection

3.12.1 Definition

Cathodic protection system shall be provided for:

- submerged structures of screening and pumping section
- seawater intake and outfall structures, if applicable
- Underground metal structures (bottom external surface of tanks, buried steel pipes, etc.).

All piping, tanks and steel structures in the project area shall be equipped with the cathodic Protection System. In order to

ensure the uninterrupted and efficient cathodic protection process, it is essential to monitor certain parameters.

3.13 Steel Floors, etc.

3.13.1 Definition

Steel floors, chequered plates, gratings, galleries, stairways, treads, kick steps, etc. shall be galvanized in general unless excluded specifically in the particular requirements. Gratings shall be painted only if specified. All other parts shall be painted after galvanizing as described below.

3.13.2 At works / site

Surface preparation	Blasting according to ISO 8501-1 Grade: SA 2 ½
Prefabrication - Primer-optional	Depending on production flow, a weldable organic zinc silicate shop-primer Dry-film thickness: 15 µm. Solids by volume min. 25%

Prime coat	Organic zinc silicate. Dry-film thickness: 60 µm. Solids by volume: min. 58%
Intermediate coat	Epoxy polyamide Dry-film thickness: 150 -200 µm Solids by volume: min. 60%
Finish coat	Epoxy polyamide Dry-film with no-skid properties Dry-film thickness: 50 -75 µm Solids by volume: min. 60%
Touch – Up at Site	Thorough cleaning to remove oil, grease, dirt and any other contaminants. De-rusting of all mechanical damage according to ISO 8501-1, Grade: ST 3 Touch-up with self-priming aluminium containing high build epoxy with solids by volume content of not less than 75%. Dry-film thickness 75-100 µm

Total system minimum dry-film thickness: 300 µm.

3.14 Concrete and Brickwork

3.14.1 Concrete & plaster (floors, walls & ceilings) in the battery rooms, & chemically aggressive environment or atmosphere, requiring special treatment, unless specified differently in particular requirements

Pre-treatment	The surface must be properly cured, free of dust, grease, oil and other contaminants.	
Prime coat	One coat Polyamide-cured epoxy	100 µm
Finish coat	Three coats Epoxy polyamide, each	100 µm
Total (dft)	400 µm	

3.14.2 Concrete surfaces outdoor (exposed)

Pre-treatment	The surface must be properly cured, free of dust, grease, oil, curing agent and other contaminants.
Prime coat	Two coat silane-siloxane primer

Intermediate coat	One coat of high built epoxy coating Solids by volume:	200 µm 100%
Finish coat	One coat of polyurethane coating- Solids by volume:	50 µm min. 50%
Total (dft):	250 µm	

3.14.3 Internal concrete surfaces underground (basements, tunnels, trenches, manholes etc.)

Pre-treatment	The surface must be properly cured, free of dust, grease, oil, curing agent and other contaminants.	
Prime coat	Two coat silane-siloxane primer	
Intermediate coat	One coat of high built epoxy coating Solids by volume: 100%	200 µm
Finish coat	One coat of high built epoxy coating Solids by volume: min. 50%	100 µm
Total (dft):		300 µm

3.14.4 Plastered walls indoor & outdoor, concrete columns & ceilings indoor

Pre-treatment	The surface must be properly cured, free of dust, grease, oil and other contaminants.	
Prime coat	One coat alkaline resistant acrylate dispersion	50 µm
Finish coat	Two coats vinyl polymeric emulsion with strong anti-fungicidal properties,	each 100 µm
Total (dft)	250 µm	

3.14.5 Un-plastered above ground concrete ceilings & floors covered by suspended ceiling & raised floor respectively

Pre-treatment	The surface must be properly cured, free of dust, grease, oil and other contaminants.
Coating	Two coats silane-siloxane

3.15 Wood

The following applies to softwood, hardwood with a moisture value of 25 and 20 % respectively used for indoor and outdoor window frames and doors.

At Works / Site

Pre-treatment	Resins must be removed by solvent cleaning Impregnation with an alkyd based containing fungicidal agent Dry-film thickness:	100 µm
Prime coat	One coat of alkyd paint wood primer Dry-film thickness:	40 µm
Finish coat	Alkyd based with colour pigments 2 x 40 µm Dry-film thickness:	80 µm

Total system minimum dry-film thickness: 120 µm.

4.0 INSPECTION AND ACCEPTANCE

The various operations during the execution of painting and of the corrosion protection works shall be performed according to the preceding provisions and are subject to intermediate inspections. These inspections can be carried out in the workshop and on site.

Intermediate inspections are necessary for all painting systems:

- After cleaning, de-rusting or blasting, as well as when repairs become necessary: Degree of cleaning, profile of anchor pattern.
- After applying the priming coats: Random sample measurements of dry film thickness.
- Before the last final coat: measurements of dry film thickness of possibly no longer accessible surfaces, removal of faults in the coating in order to obtain a clean finish.
- Before the last top coat: Holiday and pinholes tests with the pinhole detector, if in normal operation the relevant surface is permanently immersed.
- After the last final coat of all coating systems: Performance of final total dry-film thickness measurements and determination of the quality of the surface.

Where special coats are concerned, it is sometimes necessary to constantly check the course of the weather in order to avoid being below the dew point. Tests and acceptance shall be specially specified as far as special paint and coating systems are concerned. They shall be dealt with accordingly.

All tests shall be announced in time and have to be coordinated so that no interruptions occur in erection work thus avoiding any waiting periods for further painting.

All necessary measuring and testing apparatus shall be maintained in good condition by the CONTRACTOR during the erection time.

All measuring results shall be entered by the CONTRACTOR on corresponding forms and lists and handed over to the EMPLOYER.

If certificates for coating systems with special requirements are necessary, these shall be submitted for acceptance.

5.0 REPAIR PROCEDURE DURING GUARANTEE PERIOD

The entire work of painting and corrosion protection shall be inspected by the EMPLOYER during the guarantee period and before the Final Acceptance Certificate is issued.

In case of need repair work shall be carried out. All repairs during the guarantee period shall be it touch-up or complete repainting shall be performed strictly in accordance with the Contract Documents' workmanship standards. Changes of requirements during the guarantee period shall be approved by the EMPLOYER.

6.0 RESPONSIBILITIES

The CONTRACTOR shall bear full responsibility for all losses and damages that occur through inadequate painting & corrosion protection and shall carry out repairs or replacements at his cost.

The CONTRACTOR shall bear full responsibility for paint and corrosion protection applied by him on surfaces primed or painted by others.

7.0 SCHEDULE FOR FINAL COAT COLOUR

7.1 General Notes

The Contractor shall generally follow the Employer’s colour standards for all plant and equipment. The Contractor shall submit a proposed colour schedule for approval.

All valves, filters, strainers and similar equipment installed in piping shall be painted the same colour as the piping.

Piping shall be painted with identification colour bands and adequate lettering, in the following locations:

- On all pipework, at not more than 10 m intervals
- At branches in the pipework, junctions and bends
- At pumps
- At either side of all valves
- Either side of walls, bulk head, partitions

Direction of flow arrows consisting of black arrow on a white background painted on the pipework shall be provided adjacent to each identification colour band.

No special colour requirements apply to surfaces that are not normally visible, e.g. the insides of tanks.

The secondary colour band, where required, shall be one third of the width of the primary band, placed in the centre of the primary band.

Pipe supports shall be:

Outdoors: Dark Green

7.2 Standard Colours

The following standard colours shall be used

Blues	
Light blue	BS 4800 18.E.51
Lilac blue	RAL 4005
Dark blue	BS 4800 20.D.45
Mid blue	BS 4800 18.E.53
Blue green	BS 4800 16.E.56
Cobalt blue	RAL 5007
Sky blue	RAL 5015
Reds	
Crimson	BS 4800 04.D.45
Bright red	BS 4800 04.E.56
Pink	BS 4800 02.D.41
Greens	
Dark green	RAL 6005
Light green	RAL 6019
Emerald green	BS 4800 14.E.53
Blue green	BS 4800 16.E.56
Greys, Black, White, Aluminium	
White	BS 4800 00.E.55
Black	RAL 9011
Pearl grey	BS 4800 00.A.07
Aluminium	RAL 9006
Mist grey	BS 4800 00.A.05
Light grey	RAL 7035
Browns, Yellow	
Beige	RAL 1001
Deep brown	RAL 8015
Yellow	BS 4800 08.E.53

PART G: INSPECTION AND TESTING

1.0 GENERAL

This contains the technical requirements for Inspection and Testing (I&T) of material, parts, equipment and workmanship of the plant during manufacture, assembling and erection and upon completion to demonstrate compliance with the specification, codes and standards to ensure overall reliability of plant operation and performance.

The Contractor and its major sub-contractors/vendors shall each have a certified Quality System that meets the requirements of ISO 9000 or equivalent.

The Contractor's overall project quality assurance system shall cover all aspects of the Works, including design, work off-site fabrication and testing, site construction activities, pre-commissioning, start-up, and performance testing, training and handover.

In general the Contractor shall perform factory quality assurance inspections at major equipment suppliers' facilities during fabrication to ensure equipment is being built to specifications in a timely manner.

As a part of, or prior to, such inspections, the Contractor shall review supplier's quality assurance and quality control program and manuals to assure their adequacy for equipment being supplied. During the inspection, the Contractor shall verify that the supplier's quality program is being adhered to.

The whole of the works supplied under this Contract shall be subject to visual, dimensional, material, non-destructive, hydraulic, functional and performance inspection and tests by the Engineer should they so require during manufacture, erection and after completion, at the manufacturers' works and/or on site. The works shall also be subject to inspection and test by independent inspection authorities and/or the approved agencies of insurance inspection companies approved

by the Engineer in accordance with the approved Inspection Plan. The inspection and tests shall include but not be limited to the requirements of the part of the specification as listed under “General Technical Requirements for I&T" and “Specific Requirements for I&T (by Systems/Package)” of this Part.
Inspection and Testing of the works shall be limited to a practical content. Inspection and Test plan of the equipment shall be issued and shall be fulfilled by the Contractor. Contractor/Subcontractor shall provide test certificates for the equipment of similar type, rating and design.
Contractor shall prepare ITP in a reasonable manner for Employer/Engineer approval.
Costs related to those inspections and tests shall be borne by the Contractor as specified.
The cost of inspection to be incurred at manufacturer’s premises shall be borne by the Contractor. However, any cost to be incurred for Employer/Engineer’s travel, lodging will be borne by Employer/Engineer.
The Contractor shall prove that his material and/or equipment complies with the requirements of this part, such proof being the successful completion of tests and inspections witnessed by the Engineer's representative according to the approved Quality Control Plan.
Test results for all type, routine and site tests shall be recorded on appropriate test formats. All site test formats shall be subject to the approval of the Employer/Engineer.
Employer/Engineer reserves the right to demand the Contractor to appoint an independent authority to control/assure the quality requirements of the project during manufacturing or erection at site for any component/item/system.

2.0 SCOPE

This covers the complete Inspection and Testing of the Connection of Wells MW-09B, MW-10B, MW-13B MW-17A , MW-19B and SS7 brine line to Menengai Steam Gathering System together with electrical and instrumentation and controls works necessary for complete safe operation of the system. Civil, Mechanical, Electrical, Instrumentation and Control works installed by the Contractor shall be inspected to ascertain safe and reliable operation.

3.0 EXPENSES

No claim for extra compensation and/or extension of time shall be allowed because of time required for testing, inspection and repairing.
All shop and field testing certifications, reporting, and assuring of engineering quality verification and documentation of the Work in accordance with the technical specifications and the Contractor's testing program shall be performed by the Contractor at his expense.
This shall be based on the agreed Inspection and Test schedule issued by the Contractor and agreed between the Employer/Engineer and the Contractor. Traveling expense and accommodation will be borne by the Contractor. Additional inspection will be agreed with the Contractor prior to visiting the shop.
If the approved inspection plan requires any third party test, the Contractor shall arrange on his expense.
The Employer/Engineer reserves the right for inspection visits in addition to the Contractor's testing program to monitor the progress and quality of the works. Any additional visits required will be announced with written notice according to the witness points within the I&T schedule and will be agreed upon with the Contractor prior to visiting the shop. In the event that such additional inspections and tests indicate non-compliance with the terms of the Contract, the Contractor shall, at his own expense, make all necessary repairs and perform additional test(s) required to indicate compliance with the terms of the Contract.
If any item fails to pass the test or if the test cannot be witnessed by the Employer/Engineer upon his arrival at the workshops due to the fault of the Contractor or his subcontractor, and if for such reasons the postponement or repetition of the test is required, the Contractor shall bear all additional costs of the test repetition as well as the additional expenses of the Employer/Engineer.

4.0 CODES AND STANDARDS

Where no specific code or standard is mentioned then the various items of parts, material and equipment shall be tested in accordance with the relevant American, British, Italian, Japanese or German standards. IEC standards are compulsory for electrical equipment.

4.1 Reference to Codes and Standards

Reference to special codes and standards, where designated either directly or as relevant, is intended to provide a measure of performance, safety, in-shop and on-site testing, and methods of construction and/or installation which must be equaled or exceeded in order to be acceptable for use under this specification.
In all instances the finally accepted applicable code or standard shall be the version last published prior to the date of submission of the tender selected as the basis for this Contract.
Performance tests shall be conducted in accordance with standards as stated in clause 9.7.

4.2 Alternative Standards

Where no appropriate standard is available, tests shall be carried out in accordance with the manufacturer's standard

practice.
In such cases the Contractor shall submit in due time to the Engineer data and a suggested procedure forming the basis of the testing to be performed. If aforementioned standards are accepted the Contractor shall provide four additional copies in English of such alternative standards to the Engineer before any test is carried out.

4.3 Derating Standards

The Contractor's attention is drawn to the climatic conditions in the area of Menengai and where applicable in the codes and/or standards an appropriate derating factor shall be applied after the approval of the Engineer.

5.0 REJECTION

If any item fails to comply with the requirements of this specification in any respect whatsoever at any stage of manufacture, works test, erection, site test and commissioning, the Engineer may reject the item, or defective component thereof, whichever he considers necessary. After adjustment or modification as directed by the Engineer, the Contractor shall submit the item for further inspection and/or test. In the event of a defect on any item being of such a nature that the requirements of this specification cannot be fulfilled by adjustment or modification, such item shall be replaced by the Contractor at his own expense to the satisfaction of the Engineer.
The approval of the Engineer will not prejudice the right of the Employer to reject if it does not give complete satisfaction in service.
No extension of time or extra costs shall be considered as a result of material/equipment rejection.
Detail NCR handling procedure shall be submitted during project execution for information only.

6.0 FORMAL REQUIREMENTS FOR I &T

6.1 Inspection &Testing Program

All equipment provided under this Contract shall undergo workshop and site tests whether mentioned in this specification or not.
The Contractor shall issue a quality assurance program, indicating the kind and extent of inspections and tests to be carried out on plant components. The quality assurance program shall be based on the tests and inspections specified in the various parts of the specification.
An Inspection Schedule shall be prepared by the Contractor and shall be approved by the Engineer. Inspection plan is detailing the scope and schedule of inspection required ensuring that materials as dispatched meet the Specification requirements.
The Schedule shall include:

1. Relevant International Standards or equivalent National Standard. For each of the following stages of the work, the acceptance criteria shall be stated. For pressure equipment the schedule shall include all witness points, the place of inspection, short description of the test, the manufacturer and the scheduled inspection date (update every month). During witnessing the tests the specifications, standards, drawings, certificates and delivery instructions shall be available for the Employer/Engineer.
2. Stages of inspection shall cover the following:
    b. Tests to review or approve certification of material;
    c. Review and approval of manufacturing procedures; for STG no manufacturing procedures shall be submitted
    d. Witnessing tests or review and approval of certification of operator’s qualification to carry out the work required;
    e. Visual and dimensional examination of components;
    f. Pressure tests on casing and vessels.
    g. Non-destructive examination of materials in progress;
    h. Functional tests on sub-assemblies performance tests, type tests on complete units;
    i. Examination of painting, packing and documentation for shipment.

The Engineer will indicate the inspection requirements on the agreed inspection program in accordance with the following paragraphs.

1. Hold point which requires a mandatory inspection by the Engineer. This inspection or test shall be witnessed by the Engineer and further progress in manufacture shall not be made until the plant is approved by the Engineer.
2. Inspection or test of material may be carried out by the Engineer at his discretion. Witness points will need to be agreed in advance
3. Certification of material and functional test shall be approved by the Engineer before dispatch from the works. However, dispatch will not be held back for lack of inspection. For this, Contractor in his monthly report shall inform about next month inspections. Contractor shall also provide notice 15 calendar days in advance. Employer/Engineer shall attend or wave such inspections.

Independently, the requirements of the Third Party Inspection shall be indicated in a similar manner prior to the submission of the inspection plan to the Engineer for his approval and the approved Third Party Inspection requirement shall be included in the inspection program stated above. In case the STG supplier have no requirement of an independent third party inspection of any equipment, all required test of the offered equipment shall be performed in accordance to STG manufacturing procedures and shall not be subject to any third party inspection as stated above.

The Contractor shall issue comprehensive test procedures describing the kind test and the codes/standards to be followed together with the scheduled date of the intended tests. Relevant pages of all applicable codes and standards shall be attached to the test procedures.

Waiving of any tests shall not release the Contractor of his responsibility to fully meet the requirements of the Contract.

The Contractor shall submit test record forms during the design phase for the Employer/Engineer's approval. Standard forms may be used. However, any additional details requested by Employer/Engineer shall be submitted separately.

In case of standard production items, certified routine test and type test certificates shall be submitted for each item of equipment, where applicable.

6.2 Formal Requirements for Workshop I&T

6.2.1 General

The Employer/Engineer and/or authorized representatives shall be irrevocably entitled to visit the workshops of the Contractor or his subcontractors at any time with prior announcement to inspect the works performed in connection with this project and to monitor the progress of work, scrutinize related documents such as suborders or work orders and to take photos as may be deemed adequate to the judgement of the said persons to document the actual status of work.

6.2.2 Notifications and Witnessing

At his discretion, the Employer/Engineer will participate in all or in a selected number of the specified workshop tests. Hence the actual dates of said workshop tests are to be announced at least 15 calendar days in advance.

If the Engineer does not appear at the place specified by the Contractor and has not notified the Contractor in due time before test of his intention not to attend, then the Contractor shall perform the test and submit a certified copy of the results to the Engineer. This test shall not relieve the Contractor of any of his obligations under the contract. The Contractor or subcontractors as specified under the contract for the performance of the tests shall provide labour, materials, water, air, electric power, fuel, shop, apparatus and all necessary equipment for the performance of the said acceptance tests. If the equipment passes the tests, the Engineer will give the Contractor a certificate testifying to this.

The same applies to the final work's inspections or workshop tests when all test certificates shall be submitted to the Engineer.

A form sheet entitled "Test and Inspection Manual" has to be prepared showing all steps of the test procedure as well as the relevant codes and standards.

For all inspections and tests the Contractor shall provide sufficient skilled staff or service engineers. Irrespective any independent agency on behalf of the Contractor involvement in the test, Contractor's representative who is well versed about the equipment/item and its related correspondences must present for the factory acceptance test.

Whenever workshop inspections or tests are carried out all material certificates as well as all other intermediate test certificates, in accordance with the agreed test schedule, shall be made available to the Employer/ Engineer in legible copy for his information and review. Further the latest issue of the related drawings, indicating also the status of approval by the Engineer, shall be made available.

In addition to specified standards and the test procedure, the Contractor shall submit procedures for manufacture, calibration, quality control, materials testing, examination and performance testing as they apply from the procurement phase of raw materials to the finished product. Manufacture shall not begin until the procedures and material specifications documentation have been reviewed and approved by the Engineer.

All these test documents have to be submitted to the Employer/Engineer in due time before the tests are performed. Test procedures along with test for workshop tests shall be submitted not later than 45 days prior to the scheduled tests.

No inspection or test shall be valid unless the Contractor is in possession of drawings and/or specification approved by the Engineer of the equipment or materials to be tested. The Contractor shall supply to the Engineer at the time of tests a copy of all drawings as approved by the Engineer.

If any item fails to pass the test or if the test cannot be witnessed by the Engineer and Employer upon his arrival at the workshops due to the fault of the Contractor or his subcontractor, and if for such reasons the postponement or repetition of the test is required, the Contractor shall bear all additional costs of the test repetition as well as the additional expenses of the Engineer and Employer.

6.2.3 Test Reports & Certificates

Protocol sheet (inspection sheet) with subject, attendance, result and comments to be signed by all parties and distributed immediately after the tests were done. The detailed test protocol with certified copies of all tests, data and results itself shall be distributed according to this section to the Employer/Engineer.

Under no circumstances shall equipment be shipped or even packed, prepared for shipment, or dismantled for the purpose of packing for shipment, unless it has been satisfactorily inspected and approved for shipment, or inspection has been waived in writing.

If the Engineer has been duly provided with the documentation but fails to inform the Contractor regarding his comments of acceptance within 15 (fifteen) working days after receipt of relevant document, the subjected test records shall be deemed to be accepted and certified and the equipment shall be shipped.

6.3 Requirements for Site I&T

6.3.1 General

The Employer/Engineer and/or its authorized representatives are irrevocably entitled to inspect any equipment under erection or commissioning at site at any time without prior announcement to inspect the works performed in connection with this project and to monitor the progress of work, scrutinize related documents and to take photos as may be deemed adequate to the judgement of the said persons to document the actual status of work.

The equipment to be supplied under the Contract shall be tested at Site during erection, cold function (loop) checks and tests, pre-commissioning, commissioning, optimization, trial run, initial operation, reliability test and performance/acceptance test. These tests shall prove whether the equipment meets the requirements of the Contract and the safety conditions, whether it has been built and/or erected with satisfactory workmanship, whether the equipment is in conformity with the prevailing standards and regulations as well as with state-of-the-art technology and satisfies the specified operational requirements. All tests shall be carried out by the Contractor's personnel in the presence of the Employer/Engineer.

Where manufacture or finishing is done at Site, tests and inspections shall be conducted as a replacement for an appropriate workshop test.

All tests are to be accompanied by the test records signed by all parties. In case of tests involving also activity of other contractors all remarks and comments shall be placed in the test record signed by all participants.

At least one month before commencement of any site erection work, Contractor shall submit the method statement and quality control procedures for major, and safety procedures equipment or systems such as waste heat recovery boilers, steam turbines, generators, piping, tanks, pump etc. for the Engineer's approval.

The Contractor shall submit the detail Procedure or Method Statement for all site I&T for Engineer's approval. No site I&T shall be allowed until the relevant Procedure or Method Statement have been approved by the Engineer/Employer.

For major equipment and systems, it is a strict requirement that a representative of the equipment/system manufacturer shall be present as supervisor and instructor for any site tests and inspections as well as the main steps of commissioning. The Engineer shall decide, based upon the Site I&T Program, for which tests a representative is required. Prior to commencement of respective site installation work, the Contractor shall deliver a list comprising all instruments and other facilities intended to be used for the site tests together with technical details.

6.3.2 Notifications & Witnessing

Test procedures for site tests shall be submitted not later than one month prior to the scheduled tests, including all necessary drawings, excerpts of applicable standards, etc. for Engineer's approval.

At his discretion, the Employer/Engineer will participate in all or in a selected number of the specified site tests. Hence the actual dates of said site tests are to be announced at least 3 days in advance. Minor changes in the factory test schedules may be informed 24 hrs before the test.

To assist the Engineer in his review of the quality of the work being performed, the Contractor's senior field representative shall provide the Engineer with a schedule of the specific areas and items of work that will be performed during each work week. The list shall be presented to the Engineer prior to the start of work on a day to be agreed with the Engineer.

For day to day Engineer inspection approval, which is necessary to proceed with further works, the Contractor shall submit specific field inspection requests 24 hours in advance to the Engineer/Employer.

Erection and commissioning work on major items of the plant must not be continued without the approval given by the inspection report, or by permission in writing. If the Contractor continues with erection without waiting for the Engineer's decision he shall be required to dismantle the respective parts to make them accessible for inspection.

Neither extra cost nor extension of time can be claimed by the Contractor on account of such dismantling.

When additional inspection and testing is required by the Engineer it shall be performed promptly and no claim for consequent delay or disruption of the work will be considered.

6.3.3 Erection, Construction & Pre-Commissioning I&T

Erection and construction checks/tests shall be announced and carried out after completion of the electromechanical installation (with all cables connected) works.

Erection checks/tests of major installations (Electronic Room, Control Room, etc.) shall be done in one lot. Erection checks/tests of field instrumentation for mechanical/process equipment shall be done system- wise.

These tests shall be carried out to prove the completeness of the construction before releasing the plant or a part thereof for the (hot) commissioning tests.

The construction tests contain the so called cold commissioning tests, i.e. loop tests and calibration tests, impulse line pressure tests, etc., for the instrumentation and control items, cable connection test, insulation test, motor rotation direction test, etc., for electrical systems, radiographic tests, pressure and hydrostatics tests, alignment works, etc. for mechanical systems, tightness tests for the HVAC system, etc. After all tests are done for unit main components or for auxiliaries, all test records shall be compiled by the Contractor and submitted to the Employer/Engineer (one copy each) in a proper bound form with a covering sheet bearing the title: "Construction Completion Certificate" (CCC) for e.g. for the first unit, etc."

6.3.4 Construction Completion Certificate (CCC)

When a system or part of a system is completely erected the Contractor should notify in writing to the Employer/Engineer that an inspection should take place to determine that the concerned system is installed according to the Technical Specifications of the Contract and to the approved drawings.

Such notice shall be in writing and shall be deemed to be a request by the Contractor for Employer to issue a Construction Completion Certificate.

Preconditions as applicable for such an inspection are:

- System completely installed and cleaned including cable tray and ducts.
- All pressure tests have been successfully performed.
- Quality assurance should present welders certificates, x-rays etc.

The Employer/Engineer has the right to reject such an inspection when the concerned system is incomplete or reveals a very large number of Punch Items.

The Employer/Engineer will, within 15 days of the delivery of such notice either agree on the inspection of the system or instruct in writing to the Contractor that the system is incomplete.

After such an inspection the Employer/Engineer has to produce a Punch Item List within 2 weeks after the inspection took place.

Upon completion of specified unfinished portion of the works and correction of all specified deficiencies, the Contractor shall so notify Employer/Engineer in writing. Within 10 calendar days of the date of receiving of such notice either issue a CONSTRUCTION COMPLETION CERTIFICATE or give the Contractor notice of failure to complete the specified unfinished portion of the works or correct the specified deficiencies. In the latter instance, the foregoing procedure with respect to unfinished portion of the Work and specified deficiencies shall be repeated.

Discovery of minor defects, errors or omissions (Punch Item) in the works which do not prevent the plant and auxiliary installations from the start of the commissioning operation will not be considered cause for postponing issuance of the Construction Completion Certificate. In this latter instance the Certificate would be issued with a list of the Exception items attached, along with a mutually agreed upon schedule for correction and/or resolution of those items.

In accordance with the provisions of the above paragraph, the Contractor may request and Employer will issue Construction Completion Certificate for any portion of the Work in respect of which a separate Construction Completion Date within the Time for Completion applicable to the Work and each Section of the Work.

The issuance of any specific Construction Completion Certificate does not constitute Employer's acceptance of the Work or acknowledgement of the Contractor's satisfactory completion of the works. The issuance of any Construction Completion Certificate shall not relieve the Contractor from any of his obligations under the Contract connected with the Work or any part thereof.

The operation of the plant included in the Work shall be under the supervision and responsibility of the Contractor until the date of issuance of "Preliminary Acceptance Certificate".

Punch Item means incomplete equipment found during an inspection, these items are listed in the Punch Item List, this list has to be worked off and agreement has to be achieved between the Contractor and the Employer/Engineer on possible Exception Items before the relevant Construction Completion Certificate (CCC) will be signed.

Exception Item means a Punch Item, which cannot be worked off in a short period due to long delivery time of missing parts, etc. Each Exception Item must be accepted and confirmed by the Employer/Engineer and must have a definite and confirmed completion date.

After the CCC is signed for a relevant system, the system is released for commissioning to perform the Site test, loop checks, cold function tests and later on the hot function tests.

Special Erection/Erection Milestones strictly requiring a CCC are as follows:

- First Well Master Valve opened:
- Precondition: The Contractor has to produce a certificate, which has to be signed by the Employer/Engineer before First Well Master Valve opening can take place. This certificate should confirm that all necessary tests were successfully performed to secure proper and safe opening of wellhead master valve.
- Start of Blowing Out of Steam Pipes System:

- Precondition: The Contractor has to produce a Blowing Out Procedure which has to be approved by the Employer/Engineer before Blowing Out can commence.
- First Operation (steam venting):
- Precondition: The Contractor has to produce a certificate, which has to be signed by the Employer/Engineer before First operation can take place. This certificate should confirm that all necessary tests were successfully performed to secure proper and safe operation.

7.0 GENERAL TECHNICAL REQUIREMENTS FOR I&T

7.1 Testing Instruments & Equipment

Instruments and apparatus used for both site and workshop inspection and testing shall be of the best quality and subject to the Engineer's approval, and if required by the Engineer shall be calibrated to an agreed standard at a laboratory of national standing to be nominated by the Contractor and approved by the Engineer. Contractor shall provide tools and machinery required for erection and testing as well as for commissioning of the works. If calibrated measurement instrumentation is required for a precise test the Engineer/Employer may ask and Contractor shall prove that all equipment shall carry a valid calibration certificate and the calibration records shall be made available for review to Employer/Engineer. Certified label on test instrument to be provided indicating the date of certification. The Engineer will not approve test instrumentation. For the Performance Test the instrumentation shall be provided in a list and shall carry a valid calibration certificate and the calibration records will be made available for review to Employer/Engineer.
The manufacturer shall prepare a calibration schedule showing equipment type, identification number, location, frequency of checks, method of checking and action to take when results are unsatisfactory.
The cost of carrying out such calibration shall be borne by the Contractor in all cases.
For site inspections the Contractor shall be responsible for and shall include in his delivery all safety measures such as barriers, warning signs etc. required for inspection and testing while erection is in progress and all interruption of work in this connection shall be at his expense.

The Contractor shall provide all tools for commissioning and safety equipment like helmets, gloves, safety shoes and safety goggles as required for Employers commissioning team who would work in parallel with Contractor.
All pressure gauges, flow meters, venturi, orifice plates and other instruments to be used for works performance and hydraulic tests shall be of sufficient accuracy, to the approval of the Engineer and subject to routine calibration against standard instruments. Calibration
Instrumentation shall be in accordance to the applicable standard and will not be subject to Engineer's approval. The used standard for the test classifies the test instrumentation and the relevant test instrumentation shall be used. The test instrumentation shall carry a valid calibration certificate.

7.2 Non-Destructive Material Tests

When any non-destructive examination that is less than 100% in extent reveals a defect:

1. Two additional items of the same kind, by the same welder, or operator shall be given the same type of examinations; and
2. If the items examined as required by (1) above are acceptable, the defective item shall be repaired or replaced and re-examined and all items represented by this additional examination shall be accepted; but
3. If any of the items examined as required by (1) above reveals a defect, two further items of the same kind shall be examined for each defective item found by that examination; and
4. If all the items examined as required by (3) above are acceptable, the defective item(s) shall be repaired or replaced and re-examined and all items represented by this additional examination shall be accepted; but
5. If any of the items examined as required by (3) above reveals a defect, all items represented by the progressive examinations shall be either:
    a. repaired or replaced and re-examined as required; or
    b. fully examined and repaired or replaced as necessary, and re- examined as necessary to meet the requirements of this Specification and the specified design code.

The above requirements shall be applicable to both works and site inspection and tests.

7.2.1 Visual Weld Inspection

Each weld shall be subjected to a stringent visual inspection in accordance with ASME, ISO 5817, ISO 3834 or an equivalent standard. Welds shall be free from undercut, excessive spatter, craters, cracks, porosity and other surface imperfections. Weld reinforcement shall be of regular contour, uniform weld ripple and indicative of good workmanship. Fillet welds shall be checked for dimensional tolerance and form using an approved fillet weld gauge. It is preferred that fillet welds shall be slightly concave in form and each leg of the weld shall have equal length.

7.2.2 Application of Radiographic Techniques

Radiography shall be carried out in accordance with the requirements and recommendations of the applied standard.
Radiographic inspection at the manufacturer's works shall be accomplished using preferably X-ray equipment. Radioactive isotopes shall not be used without the written consent of the Engineer. Contractor may use X-ray or Gamma ray isotope source selectively. Final acceptance is subject to detailed engineering stage. Radiographic inspection of welds shall be executed according to the standard under consideration of the definitions in the standard. It is the Contractor's responsibility to obtain the necessary permits from the concerned authorities for the import and use of radioactive isotopes. Contractor may apply for the density range with 2.0 - 4.0 for Gamma-ray, 1.8 - 4.0 for x-ray according to ASME Code Section V. Final acceptance is subject to detailed engineering stage.
Image quality indicators shall be of the ISO or an equivalent type and shall be selected in accordance with the material and range of thickness to be inspected. A radiographic report shall be issued for each weld examined. The report shall give full details of the procedure used for the examination together with the thickness and type of intensifying screens, film type and specification and source to film distance. The sensitivity of all radiographic films shall be 2% or less, as indicated by the image quality indicator for density grade between 2 and 3.
The Contractor shall take all steps possible to protect personnel, visitors, and authorized representatives from the effects of ionizing radiation. The Contractor shall keep an inventory of all radioactive sources and shall be responsible for ensuring that safe procedures are adopted for the use, handling and storage of such sources.

7.2.3 Ultrasonic Examination

Ultrasonic examination shall be performed in accordance with the AD 2000 MERKBLATT HP5/3 or an equivalent standard.
Ultrasonic equipment shall be of good quality, well-maintained and reliable in operation. Probes shall not exhibit undue wear on the Perspex shoes. Each operator shall be provided with calibration blocks and shall have access to a suitable beam calibration block.
Equipment and probe systems shall be calibrated prior to each test. The pulse echo technique with A-scope presentation shall be used throughout tests.
A report shall be issued for each examination giving full details of the equipment, type, make, probe crystal, frequency and angle. Defect positions shall be identified and the size and type of defect shall be given.

7.2.4 Magnetic Crack Detection

The examination shall be performed in accordance with the AD 2000 MERKBLATT HP5/3 or an equivalent standard.
Suitable equipment shall be provided by the Contractor which shall develop a minimum of 800 amperes and preferably 1200 amperes. Tests shall be performed by qualified technicians. Probes shall be kept clean by occasional filing and shall not be spaced wider apart than 25 mm per 100 amperes of current used. The dry powder technique may be used; alternatively water- based inks may be used. Paraffin-based magnetic inks are not acceptable.
It is permissible to coat the area to be tested with a thin film of titanium oxide in a methylated spirit in order to obtain the necessary contrast.
Due care shall be taken to ensure that all arc burns are removed from the work piece upon completion of crack detection.

7.2.5 Dye Penetrant Tests

Liquid penetrant test shall be used only on pieces where geometric form does not allow examination by magnetic particle inspection.
Dye penetrants shall be of an approved type and shall be of the water-soluble ink type.

7.3 Prefab Parts

7.3.1 Forgings & Castings

7.3.1.1 General

Forgings and casting shall be examined and inspected for defects and shall be stress relieved, with documentation supporting examination and stress relief submitted to the Engineer for review prior to start of machining or further manufacturing operations. The documentation shall include a temperature/time curve for the stress relieving oven. Defects of all kinds shall be noted by the manufacturer or Contractor and procedure for repair or request for waiver shall be submitted for review by the Engineer who, upon review and/or following shop inspection, will approve, request additional or alternative repair procedures or reject the item for use in the work. Repairs shall be subjected to re-examination and re-documentation submitted as in the initial case. The Contractor shall replace rejected and/or defective items at no additional cost to the Employer. All equipment shall be designed so that no blind unvented cavities exist after fabrication or assembly.

Avoidance of incorrect Use of Materials

Positive steps shall be taken to ensure only approved materials (PMI – Positive Material Identification), including weld metal, have been used during manufacture. In the case of high-pressure items such as separators, checks shall be on a 100% basis. Spectrographic or similar equipment should be used for testing with detailed records kept for scrutiny. An approved system of colour coding shall be used to identify material which has been checked by spectrographic or other means and found to be correct to the Specification. Hard stamping shall not be used.

All castings shall be homogeneous, free of shrinkage, pipes, undersizing, porosity voids, blowholes, cracks. No welding, filling or plugging of defective parts shall be carried out without the sanction of the Engineer and then only with his approval in writing of the method to be used.

7.3.1.2 Cast Iron Castings

Materials of iron castings shall be selected from the range of materials covered by relevant standards and the inspection and quality requirements together with the other provisions of this specification shall be regarded as the minimum acceptable standard.

No weld interlocking, plugging or filling of a defective part shall be performed without the prior approval of the Engineer in writing. Full details of the proposed method of repair shall be submitted for approval.

Any repairs made to castings without prior approval shall result in rejection of the component.

Test blocks shall be integrally cast on all medium and large castings.

The Engineer may require in justified cases that certain castings be checked using radiographic techniques. The Contractor shall provide for this eventuality and shall comply with the Engineer's instructions when issued.

7.3.1.3 Aluminium Bronze Castings

The Contractor shall prepare material purchasing specifications for all important aluminium bronze castings. Each document shall indicate fully the quality and inspection requirements for the component casting covered. Copies of the Specification shall be issued to the Engineer for his use.

The inspection and quality requirements shall include an analysis of each cast, mechanical testing of test bars from each cast, pressure testing, penetrant flow detection and radiographic examination of selected critical areas.

Weldable grades of aluminium bronze may be repaired by welding provided the written approval of the Engineer is first obtained. The Contractor shall submit full details of the proposed weld repair procedure and weld procedure qualification test prior to making any weld repairs. Weld repairs of a casting defects has to be permitted following criteria which consider the defects extension related to the casting dimensions.

7.3.3 Rolled Steel Sections

The testing and inspection of rolled steel sections shall comply with applicable national codes and standards.

The Contractor shall provide to the Engineer analyses for all grades of mild steel and high yield stress steel employed on the project.

7.3.4 Pipes & Tubes for Pressure Parts

The inspection and testing of pipes and tubes for pressure parts shall be executed at the rolling mill and approved material shall be appropriately marked before transportation or shipment. The tests shall be performed in accordance with the applicable codes and standards by a recognized inspecting authority approved by the Engineer.

Upon completion of examination the Contractor shall submit to the Engineer four copies of all records and test certificates duly certified by the inspecting authority.

7.3.5 Testing of Insulating Material

The Contractor shall submit to the Engineer a list of the approved materials he proposes to use, their thermal conductivities for the operating temperatures for each application, the thickness and density of each material used and, where two layers of dissimilar materials are used, the interface temperature.

All insulation materials shall be subject to approval and shall be asbestos- free, vermin-proof, non-hygroscopic, chemically inert when wet or dry, and fire resistant.

The Contractor shall supply type test documentation about insulating materials with the main physical and chemical characteristics. Type test documentation shall be in accordance to International standards.

7.4 Welds

7.4.1 Procedure Review

7.4.1.1 Weld Procedure Documents

Prior to the commencement of welding the Contractor shall submit to the Engineer for approval the inspection and test procedure applicable to the completed weld to be used in the execution of the relevant items.
Welding shall be executed in accordance to the international defined standard and will not be subject for approval by Employer/Engineer. STG supplier shall name the standard on which the welding will be based for information.
The weld procedure documents in accordance with ISO Codes may be accepted instead of ASME Codes as specified. However, in this case, all relative codes concerning the welding procedure – including weld procedure qualification tests, welder's qualification, pre-warming and heat treatment, non-destructive tests, material specification and material tests etc. – shall be logically in accordance with ISO Codes. A mixture of codes, i.e. some in accordance with ISO Codes and others according to ASME Codes, shall be avoided for all equipment specified to be certified and stamped by an Independent Approval Authority.

The Contractor will submit a list of ISO Codes and Standards to be used by welding procedure.

The weld procedure documents shall be fully detailed and shall be indicated clearly which item it is intended to cover. The weld procedure documents shall be in accordance with ASME Codes.

7.4.1.2 Weld Procedure Qualification Tests

Weld procedure qualification tests shall be carried out in accordance with the requirements of the ASME Boiler and Pressure Vessel Code - Sect. IX. Subject to agreement, the Engineer will accept the results of weld procedure qualification tests previously carried out under the supervision of any internationally recognized inspecting authority, providing that the Contractor confirms that the basic parameters of the procedure have not been changed since approval.

Where necessary, the work shall be heated prior to welding in an approved manner and in accordance with appropriate code and or specification and the temperature shall be maintained throughout the process. A record of metal temperature shall be maintained by means of a suitable recording thermometer.

The Contractor shall inform the Engineer of any proposed changes to the welding procedure before such changes are implemented. If in the opinion of the Engineer a further qualification test is required as a result of such changes, then the Contractor shall perform the required test without additional charge.

The results of all tests shall be made available for examination by the Engineer and copies shall be retained on site.

7.4.2 Welders Qualification

Welders and welding operators shall be qualified for the work and shall hold current welders' qualification certificates in accordance with the appropriate standards of the work.

Welders' tests shall be witnessed and approved by an authorized third party authority before the welder or operator is permitted to work. The decision of the Engineer regarding the acceptability of any test or existing qualification shall be final. Evidence of previous qualification tests shall be accepted solely at the discretion of the Employer/Engineer.

Records showing the date and results of the qualification tests performed by each welder and weld operator together with the identification number assigned to him shall at all times be available for scrutiny by the Engineer. Each qualified welder and weld operator shall be assigned an individual identifying number. This number shall be marked in indelible crayon on all work performed by the welder to whom it is assigned. Any welder or weld operator whose work is the subject of multiple rejections will be required to undergo a re-qualification test on the appropriate weld procedure. At the discretion of the Employer/Engineer any welder or weld operator failing a re-qualification test may be disqualified from further welding on the works.

7.4.3 Pre-weld Inspections

Before the welding is started it shall be checked that the weld preparation is according the procedures and drawings (dimensional check), that the pre- warming temperature is within the required range (if pre-warming is required according

the procedure) and the weld material is according the specification. A checklist shall be filled in according the procedure.

Furthermore all tests as specified in the weld procedure have to be performed.

7.4.4 Post-weld Inspections

7.4.4.1 Quality Requirements for Welds

Welds subjected to non-destructive tests shall be entirely free from cracks or crack-like defects, lack of root fusion, lack of sidewall fusion, root burn through, tailed pores. The standard for porosity and slag inclusions will be as indicated in the AD 2000-Merkblatt HP 5/3 or equivalent standard for design and welding.

7.4.4.2 Mandatory Inspection

All transition welds and welds on low alloy materials and high yield steels, shall be subjected to ultrasonic examination in accordance with AD 2000- Merkblatt HP 5/3 or equivalent standard. In addition, all butt welds on these materials shall be subjected to radiographic examination and crack detection.

The number of radiographically tested welds shall not be less than 10% respectively the percentage as specified in the applicable standards, whichever is higher.

100% radiography on all weld of fuel gas pipeline shall be carried out. All butt-welds between similar material shall be subjected to 100% radiographic examination/inspection.

7.4.5 Post-weld Heat Treatment

Regardless of the requirements of the specific code or specifications applicable to the design and/or construction of the plant and associated pipework, it is a mandatory requirement of this Specification that all welds shall be subject to appropriate post weld treatment with the following exceptions:

1. Austenitic stainless steels.
2. Plain carbon steels containing less than 0.25 per cent carbon at thickness up to and including 30 mm.
3. Low allow steels containing ½ per cent molybdenum and 1¼ per cent chromium, ½ per cent molybdenum up to and including thickness of 12.5 mm provided that:
    a. A hardness traverse across the weld zone gives no single result > 240 HV 10, and
    b. No fillet weld leg is greater than 8 mm, and
    c. A minimum preheater of 200°C is used for welding.

All welds in plain carbon steels containing between 0.25 and 0.4 per cent carbon are required to be post weld heat treated at a temperature in the range
630 to 670°C.

All post weld heat treatments of materials and components for use at temperatures in excess of 400°C shall be so designed as to guarantee maximum creep properties in the parent materials and weldings.

The soaking times at the selected heat treatment temperatures shall be:

- Plain carbon steels containing less than 0.4% carbon 2.5 minutes per mm of thickness with a minimum time of 30 minutes.
- Low alloy steels containing vanadium, 5 minutes per mm of thickness with a minimum time of 120 minutes.
- Steels containing vanadium and high chromium steels (e.g. 11 to 15%),180 minutes regardless of thickness.

In the event that any post weld treatment is carried out at a temperature in excess of the original tempering temperature of the parent materials a reassessment of the design strength limit stresses for the materials will be required. This may, in the absence of acceptable mechanical test data for the specific condition, require re-determination of the relevant mechanical properties of the materials.

The requirements for post weld heat treatment do not affect or replace in any way the requirements for maintenance of welding preheats or post welding heating for the purposes of diffusing hydrogen from the weldings.
Welding after stress relieving is prohibited.

7.4.6 Weld Repairs

A procedure for all weld repairs shall be submitted by the Contractor to the approval of the Engineer.

All weld repairs shall be made using the same procedure as for the original weld. All tests shall be repeated after the repair has been completed and reports on radiographic and ultrasonic tests shall be marked to indicate that the report refers to a repaired weld.

7.4.7 Special Requirements for Site Welds

7.4.7.1 Welder's Qualification Tests

All welders and welding operators shall be qualified for the work and shall hold current welders' qualifications certified in accordance with the appropriate British, American or German standards.

All welders' tests shall be witnessed and/or approved by the Engineer before the welder or operator is permitted to work. The decision of the Engineer regarding the acceptability of any test or existing qualification shall be final. Evidence of previous qualification tests shall be accepted solely at the discretion of the Engineer.

Records showing the date and results of the qualification tests performed by each welder and weld operator together with the identification number assigned to him shall at all times be available for scrutiny by the Engineer.

The welder qualification test shall be performed on the test coupon in accordance with qualified welding procedure specifications. Welder qualification test using the production weld shall not be permitted. Each qualified welder and weld operator shall be assigned an individual identifying number. This number shall be marked in indelible crayon on all work performed by the welder to whom it is assigned. Any welder or weld operator whose work is subject to multiple rejections will be required to undergo a re-qualification test on the appropriate weld procedure. At the discretion of the Engineer any welder or weld operator failing a re- qualification test may be disqualified from any further welding on the works.

Procedure for welder performance monitoring at site where radiography is performed shall be submitted to the Engineer for approval.

7.4.7.2 Execution of Welds on Site

The Engineer shall be notified in writing at least two days prior to the commencement of any assembly or fabrication work.

Welders and welding shall be protected by suitable equipment from wind, airborne sand and moisture. Work shall not be performed when weather conditions do not permit satisfactory workmanship or adequate inspection. Dependent on the parent material, weld preparation profiles may be prepared by machining, shearing, flame cutting (not for stainless steel) and grinding and shall be performed carefully and accurately. Whenever possible a mechanically guided tool shall be used for flame cutting. All edges shall be left free of slag, burrs, fins, oxides and foreign matter and the finished profile shall conform to the design tolerances for the weld preparation. Before weld execution the profile shall be dry and free of any humidity in the form of condensate, oil etc., and edges of all parts exposed to pressure or heavy loading shall be examined by ultrasonic, liquid penetrant or magnetic particle method. Examination by the magnetic particle method shall be approved. Line-up clamps shall be used and shall not be removed until the root weld has been completed. Where spacer strips or bridging pieces are utilized due care shall be taken when the tack welds are removed. All scars and blemishes shall be ground off prior to submitting the weld for inspection.

Tack welding of weld preparations may be permitted but all tacks must be ground to a feather edge prior to completing the root pass. Electrodes and preheating for tack welds shall be the same as that required for the completion of the weld. Any defective tack weld shall be removed prior to welding the root pass. Tack weld shall be done by qualified welder with qualified welding procedure.

Tack welds on pressure retaining parts and on parts carrying principal stresses shall be examined in the same way as the principal welds.

Where preheating is required by the welding code it shall whenever practical be carried out by electric resistance or induction equipment or by specially shaped gas burners. Preheat and interpass temperatures shall be checked by temperature indicating crayons at a distance of not less than 75 mm from the weld groove. The use of hand held torches

for such preheating is not permitted. However “drying” of pipes being made of material, which does not require preheating by the welding code, can be done by torches.

All slag, excess filler metal, and surface irregularities shall be removed between weld interpass runs. Cleaning may be carried out by hand or power tools. Flame gouging is prohibited.

Back chipping may be carried out by arc air gouging providing that the weld groove is ground to a smooth profile, all surface irregularities arising from the arc air process are removed and all surfaces are inspected in accordance with relevant standards.

Welded-on attachments such as lugs, cleats, supports etc. shall be positioned well clear of all pressure retaining welds and welds carrying principal stresses. If it is found essential to bridge or span a principal weld then the attachment shall be designed so as to ensure that no further weld is positioned within 40 mm of the principal weld. Attachments bridging principal welds shall be designed to give a minimum clearance of 25 mm over principal welds.

All transition welds between dissimilar materials shall be made under controlled conditions at the manufacturers' works. Site welding of structural high yield steel will not be permitted without the prior consent of the Engineer.

All tube butt welds shall have 100% penetration with a maximum of 3 mm excess penetration in the root run.

Unless otherwise specified, welds subject to radiographic, ultrasonic or other forms of non-destructive test shall be dressed to a smooth contour. Care shall be taken to blend weld and parent metal without under-flushing. Branch and attachment welds shall be finished to a smooth contour and the toes of the weld shall be dressed smooth. Welds made by submerged arc process or other approved methods may be left unfinished providing the weld ripple does not interfere with the assessment of non-destructive test results. All weld dressing shall be carried out before final heat treatment.

Post-weld heat treatment shall be performed in accordance with approved standard and shall be carried out using equipment designed specifically for the process. Gas burners or hand held torches shall not be permitted. For work which is heat treated in a furnace, the Contractor shall supply copies of the heat treatment charts. Work which is subjected to heat treatment by means of electrically heated elements shall be monitored by suitable thermocouples connected to a chart recorder. A minimum of two thermocouples shall be used and copies of heat treatment charts shall be made available to the Engineer.

7.4.7.3 Quality Control of Welds and Materials

Prior to the commencement of welding on site the Contractor shall submit to the Engineer for approval the welding procedures to be used in the execution of the relevant sections of the work.

Welders and procedures shall be qualified on actual work material and weld position.

Except where otherwise specified all materials to be welded and welds carried out on site shall be tested in compliance with clause 7.4.3 and 7.4.4 of this Specification.

The Contractor shall supply a minimum of two scintillation counters to the site for use by the radiographic personnel and by the Engineer as required.

The Contractor shall maintain and keep current a record of all pressure equipment welds against the individual welder identifying number on a weld map or register that shall form part of the QA package.

In the event of any prescribed test not meeting the requirements of the agreed standards, the defects in the welds represented by that test shall be rectified and the Engineer or the approved inspecting authority may call for an increase in the number of tests required until such time as a satisfactory quality is achieved.

The Contractor shall take all steps possible to safeguard site personnel, visitors and authorized representatives from the effects of ionizing radiation. The Contractor shall keep an inventory of all radioactive sources supplied to the site and shall be responsible for ensuring that safe procedures are adopted for the use, handling and storage of such sources.

7.4.7.4 Non-destructive Examinations

The non-destructive weld and material examinations on site shall be in compliance with clause 7.2 of this specification.

7.5 Mechanical Component Tests

7.5.1 Dimension & Alignment

The correct alignment of rotating equipment which is to be coupled onsite installation to other rotating parts (e.g. motors, generators, reduction gears etc.) shall be demonstrated by the Contractor to the Engineer. The alignment results will be entered in an appropriate alignment report sheet which is to be countersigned by the Engineer and the Contractor's representative. The alignment shall be demonstrated on site.

Alignment equipment shall be included in the workshop equipment for maintenance purposes.

7.5.2 Hydrostatic & Vacuum Tests

7.5.2.1 Hydrostatic Tests

All cast, forged or fabricated pressure vessels or enclosures and all
completed pipes, valves, drums, headers, boiler heating surfaces, heat exchangers, bends and fittings which are to be subjected to internal pressure or vacuum during operation shall be subjected in the maker's works to tightness and hydraulic tests as specified in the relevant standards. The test pressures shall be maintained for a minimum of 30 minutes or longer at the discretion of the Engineer to permit complete examination by the Engineer. Cast steel components of the steam turbine are not subjected to a hydrostatic test according to manufacturer’s standard if in line with the applied manufacturing codes/standards. The said deviation is applicable for steam turbine only but with the exception of prototype, new material or new supplier.

All tightness and hydraulic tests shall be carried out prior to surface coating or painting. Enclosed structures may be subjected to hammer testing.

The manufacturer shall supply labor and appliances for such testing as may be carried out on his premises. Failing facilities at his own works the manufacturer shall make arrangements for carrying out the tests elsewhere.

The testing shall include, but not be limited to, the following equipment:

7.5.2.1.1 Pressure Vessels & Atmospheric Tanks

Pressure vessels shall be tested in accordance with the appropriate design code and are subject to the approval of the Engineer. The pressure vessels shall be tested at 1.5 times the design pressure of the relevant operating system.

All prefabricated tanks operating at atmospheric pressure shall be subjected to a hydrostatic test with the tank filled with water to full cylindrical height. The external surfaces shall be thoroughly chalked and the pressure maintained for a minimum of 24 hours.

All tests on the pressure vessels shall be made to obtain appropriate certificates from the relevant national or International governing bodies.

7.5.2.1.2 Pipework

All pipework shall be tested hydraulically for a minimum of 2 hours and only if necessary air pressure tested in order to check its tightness.

Pipework shall be tested in accordance with the applicable design code, but the test pressure shall not be less than 1.5 (one and one half) times the design pressure of the relevant operating system. In any event a pressure of not less than 4.5 bar shall be used.

7.5.2.1.3 Valves & Fittings

The body of each valve or fitting shall be hydraulically tested in accordance with ASME B16.34 Paragraph 7.1 Shell test or to the equivalent clause in the code that the valve has been manufactured to. In the particular case of safety valves the seats shall be blanked and the hydraulic pressure applied only to that part of the body on the inlet side. Where applicable, a seat tightness test using air or water shall be performed. The tightness test with air shall be performed at a pressure equal to 0.1 times the design pressure of the system, subject to a maximum of 2 bar. Proof of tightness shall be provided by painting with a readily foaming liquid, by immersing or by equivalent methods. When using water for the tightness test,

the test pressure shall correspond to the permissible operating pressure of the system as defined by the pressure/temperature function at the lowest operating temperature.

For low pressure valves the above test requirements shall be carried out on a random check basis covering at least 10 % of each type of valve.

Leakage testing of low-pressure valves may be included in the pressure testing of the line system concerned. If the test medium is water the pressure test shall be carried out at 1.1 times the design pressure for a period of 2 hours.

If the test medium is air the pressure test shall be carried out at 0.1 times the permissible operating pressure subject to a maximum of 2 bar. In this case the period is 15 minutes. In the case of pressure tests using air, the valve body, including spindle gland and flange joints, shall be painted with a bubble-producing agent.

Tubular glasses for water gauges and sub-assemblies containing the glasses for water gauges of the through type or reflex glass type shall be tested to not less than one and one half times its design pressure. Fittings which may suffer internal damage e.g. steam traps; bellows-operated instruments etc. as well as pressure gauges shall be tested in accordance with the relevant codes.

7.5.4 Metal Piping & Vessels

The Contractor shall test all his work in the presence of the Engineer as follows:

- Inspection of materials used on the basis of the field manual to be supplied by the Contractor for verification of pipe marking and information on materials
- Random testing of pipe dimensions
- Random radiographic testing of at least 15% of all welds. If, according to the first random-test results, 5% of the tested welded seams are not perfect, another 10% shall be tested. In the event of further faults being detected, all seams shall be radiographed. These additional tests, the checks of newly welded seams and all repairs shall be at the expense of the Contractor.

The production of welds to be tested shall occur as instructed and in accordance with local construction progress.

Samples for random tests shall be selected so that each welder employed is tested. In the case of pipes up to DN 80, two (2), in the case of pipes from DN 100 to DN 400, three (3), and in the case of pipes of a diameter larger than DN 400, four (4) partial acceptances are to be made per weld.

All welded seams in pipes, headers, manifolds, valves etc., executed on site, shall be tested by means of X-rays, radioactive isotopes and/or ultrasonics. However, testing by radioactive isotopes may only be done with the approval of the Engineer.

Headers and manifolds shall be tested in the same way as pipes of the relevant dimensions.

The following tests shall be provided for the pipe lengths and fittings:

- 100% X-ray and ultrasonic testing of welded seams in accordance with the standard the pipe is purchased to.
- 100% Ultrasonic testing of branch welded seams and pipe bends,
- 100% pressure testing of pipe and fittings by means of water in accordance with the relavant code the pipe and fittings are purchased to. Where not applicable replaced by 100% NDT.

Brine, condensate and steam piping lines shall be hydrostatically tested in accordance with ASME B31.1 (Power Piping Code). Testing shall be carried out as each line is completed, and after all interconnecting piping has been installed up to an isolating valve and all threaded thermo wells and instrument connections have been completed.

Site welds not hydrostatically tested shall be non-destructive tested in accordance with the Code requirements but not less than:

- 100% visual inspection on all welds
- 100% MT (Magnetic Crack Test) on all welds
- 25% RT (Radiographic Test) on butt welds and 100% RT on branch connections, i.e. the weld between the branch pipe and the run pipe).

Expansion joints shall be restrained or otherwise protected during tests and any pressure gauge or other device that would be damaged either by water or the test pressure shall be removed or otherwise protected during the test.

Below the seat of a closed valve, globe valves shall not be subjected to a test pressure greater than one and a half times the primary service pressure rating of the valve. Full pressure may be applied above the seat of the closed valve or if the valve is open.

The test pressure shall be maintained for a sufficient length of time to enable inspection to be made of all joints and connections. Any pipework, valve etc. found defective shall be repaired and the piping re-tested as specified above.

Equipment necessary for conducting tests including pumps, gauges, etc. shall be of the best quality and shall be provided by the Contractor.

1. **Instrument Air Piping**
   Testing shall be carried out as each line is completed and after interconnecting piping has been installed up to an isolating valve and threaded thermowells and instrument connections have been completed.

2. **Measuring Impulse Piping**
   Instrument take-off piping up to the first block valve shall be tested with the piping or equipment to which it is connected. Instrument headlines, between the first block valve and the instruments to which they are connected, shall be pressure or leak tested with the instruments disconnected. Testing may be performed separately or at the same time as the piping or equipment is tested.
3. **Underground Services and Drains**
   Underground lines shall be visually inspected prior to testing. Underground services and drains at atmospheric pressure shall on completion of routing be tested hydrostatically under a head of not less than 3 meters of water. Underground line joints shall be left exposed until completion of field pressure and leak testing.

4. **Water Piping**
   Before being concealed or insulated and before acceptance of the work, water piping shall be subjected to a hydrostatic pressure test.

For protection of control valves and accessories during the period of flushing and blowing out of the system, control valves shall be equipped with suitable valve seat inserts.

7.6 Electrical Component Tests

Electrical equipment and material which is not covered by the tests specified elsewhere in this document shall be inspected and tested in accordance with standards listed hereafter, in accordance with the latest valid approved edition.

7.6.1 Rotating Electrical Equipment

7.6.1.1 General

The rotating electrical equipment shall be tested in accordance with the following standards:

IEC 60034, IEEE 115, IEEE C50, NEMA SM, ISO 1680 and ISO 10816.

7.6.1.2 Motors

Each motor shall be factory tested and shall undergo a test at site.

For each type of MV motors type tests to be performed on one motor and routine tests on the other motors.

Type test certificates of identical MV or LV motors will be accepted. The following tests shall be performed under full responsibility of the Contractor.

Workshop Tests:

- Measurement of winding and insulation resistances
- No-load and current measurement
- Open circuit secondary induced voltage test at stand still (wound rotor)
- High voltage test
- Over-speed test (120% for 2 minutes)
- Locked rotor current and torque measurement (type test)
- Temperature rise measurement (type test)
- Power factor and efficiency measurement (type test)
- Measurement of noise level (type test)

7.6.2.4 Control Cubicles, Kiosks & Terminal Boxes

- Checks on functioning of contactors, overloads isolators and general operation of control circuits for cooling gear
- Checks on operation of circuits for thermometers, thermal images, pressure relief valves, oil and gas operated relays, flow detectors, heaters, lights and power output sockets
- Checks on wiring arrangements and terminal boards
- Checks on weather sealing of doors, cable glands and other external features
- Visual and dimensional checks

7.6.7 MV cables

MV cables shall be workshop tested as per IEC 60502-2 with the following tests as a minimum:

Type tests:

- electrical type tests acc. to: IEC 60502 - 2 Clause 18.
- non electrical type tests acc. to: IEC 60502 - 2 Clause 19

Also following additional type tests shall be carried by the Employer at their own cost prior to the first shipment of all offered cable if no type test certificates of identical cables are available:

- Fire Resistant according to IEC 60331, BS 6387
- Flame Retardant according to IEC 60332
- Low Smoke Test according to IEC 61034
- Halogen Content Test according IEC 60754
- Water Tree Test of XLPE Insulation (accelerated):
- Test voltage = 3 x Uo
- Test frequency = 500 Hz
- Core environment = 40^0C water
- Duration of test = 4 month
- Test after 4 months: Dielectric stress withstand >14kV/mm

Moreover, test certificates shall be provided, proving that each cable type to be used has successfully passed type tests as

required by the applicable standards during the last 12 months before award of contract. Otherwise, these tests have to be repeated on sample sections.

7.6.10 Materials for Earthing & Lightning Protection

IEEE 80	Guide for safety in AC Substation Grounding
IEEE 142	Recommended Practice for Grounding of Industrial and Commercial Power Systems
IEEE 81	Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface potentials for Ground system
IEEE 665	Guide for generating station grounding (as guidance because the standard were canceled without substitution)
IEC 60364	Electrical Installation of Buildings (e.g. Protection against Electric Shock; Earthing Arrangements, Protective Conductors and Protective Bonding Conductors)
NFPA 780	Installation of Lightning Protection Systems
IEC 62305	Protection against lightning

7.6.16.8 Control and monitoring equipment

During the erection period and before the associated plant item is put into operation all control and monitoring equipment shall be tested. These tests shall include calibration and functional tests in addition to on-line commissioning for the following:

- calibration tests of all analogue measuring loops including all remote indications and recorders and the input signals used for closed loop control
- wiring test of all control cabling in the field, relay room and control rooms combined with the function tests
- testing of all control modules in the control room
- functional testing of remote control of drives, circuit breakers, solenoid valves, actuators, etc.
- testing of remote and logic control devices especially all sequence logic equipment using simulated inputs
- testing of all interlocks to ensure safe operation
- testing of the alarm annunciation and event recorder system in connection with all field and control room devices using simulated inputs
- testing of all closed loop controls.

The Contractor shall submit a comprehensive description of each test to the Employer/Employer's Representative for approval. This shall include the type and classification of all test equipment and shall be submitted at least two months before the proposed date on which each test is to be carried out unless otherwise specified.

Certificates and test reports shall be issued for each test made to Employer/ Employer's representative for approval. Group certificates are acceptable for the tests of cabling and similar items.

7.7 Instrumentation and Control Equipment Tests

7.7.1 General

Instrumentation and control equipment shall be tested at the manufacturers' workshops before dispatch to site. Certificates or test reports shall be issued for all tested equipment and systems.

The Contractor shall submit a comprehensive description (test program) of each test. This shall also include the type and classification of all test equipment and shall be submitted at least one month before the proposed date on which each test

is to be carried out.

Where temperature or humidity limits are specified by the manufacturer, tests shall be carried out on each type of equipment to demonstrate that the equipment is capable of operating correctly within these limits.
7.7.2 Calibration tests

The Contractor shall carry out calibration tests of the following instruments and equipment in accordance with the applicable standards:

- local indicators over the full range
- analogue transmitters over the full range of the transmitter
- binary transmitters over the full range of the transmitter, including preliminary setting.
- remote indicators over the full range of the indicator
- one of each type of thermocouple or resistance thermometers
- Superheated steam thermocouples
- Analysers and probe sampling equipment over the full measuring range by use of test gas or test liquid

Contractor shall provide typical calibration data for each different type of transmitter. This shall include the following:

- Five points calibration data within the range or minimum transmitter signal and maximum transmitter signal to ensure the transmitters work linear.
- Minimum transmitter signal below which it can be assumed that the transmitter has failed.
- Maximum transmitter signal above which it can be assumed that the transmitter has failed.
- Maximum zero drift after one year.

7.7.3 Orifices, Nozzles, Thermowells

Test of materials shall be carried out for all orifices, nozzles, thermowells etc. corresponding to the tests for the piping system in which they are fitted. The actual dimensions of all orifices, nozzles, venturi nozzles have to be certified by the Contractor.

7.7.4 Control Valves

Control valves shall be tested according to Clause 7.5.
Mechanical functional tests on the control valves shall be performed with the actuator mounted (open to closed position and vice versa). Actuators shall be subject to mechanical and electrical function tests.

During the erection period and before the associated plant item is put into operation all instrumentation and control equipment shall be tested by the Contractor in close collaboration with the contractors of the other contracts wherever any interconnection exists.

7.8 Civil Works Tests

7.8.1 General Requirements

7.8.1.1 General

The Contractor shall submit all test certificates of materials for approval by the Engineer and shall arrange for tests of all materials to be carried out in laboratories on site or elsewhere, or in Contractor's shop as and when directed by the Engineer. The cost of all test equipment, samples, tests and transport for tests shall be borne by the Contractor (to be included in the lump sum for this Contract) and the tests shall be performed by efficient and well-qualified staff.

The Contractor must carry out all requisite tests on material samples in order to verify their compliance with the specifications. The testing operations shall be performed in accordance with the relevant codes or standards and under the supervision of the Engineer.

The test samples of materials which have been approved by the Engineer shall be kept in a safe place and protected against damage or deterioration until completion of the works.

Where in the specifications materials are specified to be approved by the Engineer, samples shall be submitted for approval at the earliest possible date and strictly before any purchasing or delivery to the site is made. The individual tests and inspection for the materials, supply and execution shall be carried out in compliance with the requirements of the individual technical specifications. In the case of rejection, further samples of the rejected materials shall be submitted to the Engineer until they are approved or the material replaced with one more suitable. The Engineer may reject any material which in his opinion is not in accordance with the approved standard. All samples shall be submitted free of charge to the Engineer.

The characteristics as determined in the samples which are approved shall indicate the standard to be maintained in the materials used in the execution of the works.

7.8.2 Quality Control Procedure

7.8.2.1Civil Works Quality Plan

The Contractor shall submit for approval of the Engineer a Civil Works Quality Plan with the whole Quality Control Procedure.

7.8.2.2 Nominated Person

The Contractor shall appoint a management representative to be responsible for all quality control matters. His other functions shall be limited to permit sufficient attention to be given to quality control. He shall have the necessary authority to execute such responsibility to the satisfaction of the Engineer. The Engineer will appoint a representative from amongst his site staff, to coordinate quality control matters.

7.8.2.3 Review Procedure

The quality system shall be subject to periodic joint reviews by the Contractor and the Engineer to ensure:

1. The essential requirements described above are being met.
2. That the Engineer can order and has adequate notice to attend each inspection and testing, and if he declines then is notified of the results as soon as practicable, but without disrupting the Contractor's schedule.
3. Reveal defects, irregularities and shortcomings.
4. Suggest improvements.
5. Verify corrective action procedures are effective.

7.8.2.4 Laboratories

The testing laboratories shall be as follows:

1. A Third Party Independent Laboratory (TPIL) for testing of concrete works and earthworks. For testing of these works, sampling, handling, transport to the laboratory, reporting and analysing of the test results shall be by TPIL. The TPIL shall be to the approval of the Engineer. The reporting and analysing of the test results shall be directly to the Engineer. The costs of all the tests and activities if performed by TPIL shall be borne by the Contractor.
2. Laboratory (ies) by the Contractor (LC) for testing of all other works according to the specification. This (these) laboratory (ies) may be used by the Contractor for further testing, such as his own quality control or retesting in areas of previous failure. The Contractor may instead use the TPIL.

For the LC the Contractor shall provide all equipment, labour, staff and facilities necessary to carry out the necessary tests.
For testing of these works, sampling, handling, transport to the laboratory, reporting and analysing of the test results shall be by the Contractor. The costs of all above mentioned tests, equipment, labour, staff and acilities shall be borne by the Contractor.

7.8.2.5 Notifying & Informing the Engineer

The Contractor shall notify and inform the Engineer as follows:

a. Formally of the commencement, interruption or recommencement of any new area of working, wherever possible 24 hours in advance.
b. In advance of any inspection, calibration sampling or testing to enable attendance by the Engineer.
c. Of the results of tests not attended by the Engineer as soon as practical after testing.
d. By formal submission of results (weekly).

e. By formal summary and analysis of results whether weekly or monthly as instructed in advance or monthly in default.

Notifications as described by b) and c) above may be verbal, to a schedule arranged at the joint review or by handwritten notes informally submitted subject to the approval of the Engineer. However, should the Engineer consider such notifications inadequate as to accuracy, comprehensiveness or warning then such approval shall be withdrawn and such notifications shall be formally in writing with at least 24 hours advance notice of testing and no considerations shall be given to any disruption to the works thus caused. The information as per items a) through e) above shall be submitted in 3-fold.

7.8.2.6 Engineer to Instruct

The Engineer may select the sampling point at no cost. The Engineer may instruct tests at no cost provided either the overall frequency governed by the specification is not exceeded and the notification given to the Contractor is equal to that currently being provided by the Contractor for his normal testing in formality and warning, or the Engineer has due cause to suspect a change in the quality, such concern having been advised to the Contractor.

The Engineer may instruct sampling, testing or both which satisfy only some or none of the above criteria.

7.8.2.7 Engineer to Inspect & Test

The Engineer shall have the right to carry out independent inspections and testing either using his own resources or those of a third party. Should the Engineer require the results to determine the conformance with the specification then he shall notify and inform the Contractor at least to the same degree as the minimum of the following three options of the Contractor informing the Engineer:

a) Specified; as described above.
b) Agreed; as part of the quality system review as described above.
c) Actual.

(It is to be noted that should the Contractor repeatedly fail to notify or inform the Engineer of inspections, sampling or testing (if any) then the Engineer may carry out independent checks without informing the Contractor and reject parts of the works should the results of such inspection or testing fail).

As far as is practicable the Engineer shall have free access to the site, fabrication areas and suppliers work at all times without notice. Should he discover unsatisfactory work then he will invite a formal joint inspection. Either after such an inspection or if the Contractor declines the invitation the Engineer shall issue instructions with regard to the faults and their reparation.

7.8.2.8 Approval process

All items to be incorporated in the permanent works require approval by the Employer/Engineer. Normally approval is to be a staged process. Stages are to be applicable to the item in question but shall comprise some or all of the following:

a) Supplier or source.
b) The material or product.
c) A mixture or combination of materials or products.
d) Repeats within tolerance.

The Contractor shall supply, as far as is practical, the following information:

a) On supplier or source a review of previous performance in supplying to similar specifications, evidence that he can legally supply to Kenya, capacity of plant, other ongoing commitments, details of main items of plant and key personnel, independent references (if any and preferably unsolicited), test reports on similar products (again preferably independent), a signed statement that the source will be open to inspection at all times before and during the time of supply and for major suppliers a statement that they have read this contract and their financial conditions of supply are allied thereto (i.e. if their material or product is found to be faulty and thus not liable for payment under the main Contract then the Contractor will not be left with a bill or debt that will inhibit his commitment to undertake his other obligations under this Contract).

b) On materials or product a copy of drawings, design calculations, supplementary specifications, previous test results, inspection, taking samples and tests according to the specification. All necessary and sufficient information to demonstrate

conformance with this specification.
c) On mixes and combinations as b) above.
d) On repeats a selection or schedule of tests to monitor deviation from the results obtained under b) and c) above plus spot checks and/or independent checks to do likewise.

7.8.2.9 Rejection

Should any materials, items or complete parts of the works fail to comply with the requirements of this specification when tested in accordance with this section the Engineer may reject such materials or items, or condemn complete parts of the works, and demand of the Contractor such replacement or modification as may be necessary to ensure their compliance.

Should modification or adjustment be deemed a satisfactory alternative to demolition and/or removal, the Contractor shall submit full details in writing such modifications to the Engineer for approval, and should such approval be forthcoming carry them out without delay.

If however, he is required to demolish and/or remove any such items or materials this shall be carried out quickly and with as little disruption to the works as possible.

No claims of any sort whatsoever will be entertained arising from the rejection of any part of the works through failure to meet this specification, and repairs, demolitions, removals, additional testing etc. shall be entirely at the expense of the Contractor, nor shall any official extension of the Contract period be granted for such a reason.

7.8.2.10 Transport, Handling & Storage

If for any reason materials or other items are received or made on site before approval of them has been granted, these shall be transported, handled and stored separately or labelled in such a way in order to, wherever possible, prevent them being incorporated into the works or, should such prevention not be possible, to accurately define the part(s) of the works in which such materials or items were used.

Approvals previously granted for any materials etc. shall be withdrawn if they are not properly transported, handled or stored and otherwise protected against weather or contaminants which may adversely affect their properties. The Contractor has the option of removing such materials or having them retested for approval.

8.0 SPECIFIC REQUIREMENTS FOR I&T (BY SYSTEMS/PACKAGE)

8.2.4 Brine and Condensate Reinjection Systems

The following tests shall be performed on site during/after the erection and assembly of the system:

- Hydrostatic test
- Functional check of all valves
- Characteristics/setpoint check of valves and safety valves
- Cleanliness check of the pipin g, especially at low points

8.2.5 Analysing Equipment

All analysing equipment shall undergo a functional test on site and demonstrate that it is properly calibrated.

8.2.6 Cranes, Hoists & Lifts

8.2.6.1 General

All items of lifting equipment shall be tested to the relevant standard and electric overhead cranes with the associated structural members.

All cranes and hoists shall be assembled at the manufacturers' works and functional tests without load shall be executed to the satisfaction of the Engineer.

The Contractor shall supply to the Engineer all necessary test certificates for individual parts of the installation, such as ropes, carrying cables, carrying chains, pistons, cylinders, hoses, electrical equipment etc. for all cranes, hoists and lifts.

Calculations shall be provided for evidence of sufficient drive capacity and strength of the main parts including the drive machinery.

The Contractor shall erect the cranes and their supports and shall load the cranes to the requirements specified in BS 466 or equivalent standards. Deflections of the main girders shall be taken before, during and after proof loading. The Contractor shall demonstrate each of the operations of the cranes using the control devices provided for this purpose. Cross traverse limit switches shall be checked and tested. High voltage tests and insulation values shall be taken upon completion of all tests.
The Contractor will be responsible for providing test weights and materials and dispose of the same after load test.
The Contractor demonstrates to the satisfaction of the Engineer that all the crane motions work correctly and reliably; that all limit switches operate correctly.
The Contractor will be responsible for providing test weights and materials and for disposal of the same after the load test.

Work Performance Tests and Component Tests
Items including hooks, ropes, shackles shall be tested in accordance with the requirements of:
Hooks: BS EN 1677-5 & 3017
Ropes: BS EN 12385
Shackles: ISO 2415

Hydraulic Tests
Gearboxes and hydraulic equipment shall be tested to ensure that it is oil-tight and without defects of workmanship
Gearboxes not subject to pressure shall be tested to 0.1 for 30 minutes. Pressures parts gearboxes and hydraulic equipment shall be tested to 1.5 times the design pressure.
All hydraulic tests shall be carried out before painting or coating is applied.
Preliminary Function Tests
The Contractor shall demonstrate to the satisfaction of the Engineer or this representative that all the crane motions work correctly and reliably and that all limit switches operate correctly.
Deflection Test on Bridge Girders
Each bridge girder is to be checked for deflection by loading to the equivalent overload capacity with the two ends on simple supports.

Brake Test
Performance of the brakes shall be proven as follows:
- Check of overload trip
- To suspend 125% of the nominal load without drift
- To stop the nominal load within 10 mm of vertical travel when lowering at maximum rated speed
- Deflection of girder and hooks at nominal load
- To lower nominal load without exceeding the hoist motor synchronous speeds
- To lower empty hook at maximum rated speed

During trial operation, the crane shall be tested under operational conditions and with the specified speeds under loads for lifting, lowering inching, braking and transporting. The actual deflection shall be measured and compared with the allowable ones stated in the applicable standards.

A complete inspection and overhaul shall be performed at the expense and in the presence of the Employer's personnel by the Contractor to return the cranes and hoists to the condition of new equipment if, they have been used by the Contractor on Site for erection purposes, prior to being taken over by the Employer.

Overload Tests
Main and Auxiliary hoists shall be tested to lift a minimum test load of
125% at the mid-span of the bridge girders.

The test load will be lifted and moved through the various motions of the crane sufficiently to test all the different gearings, the switchgear and controls.

The above tests may be witnessed by or repeated in the presence of the
Inspection Authority in order to obtain the required Fitness Certificates. All settings shall be recorded by the Contractor and confirmed by the Engineer.

8.2.7 Electrical equipment
Refer to Part C for further inspection and testing requirements.

8.2.8 I&C systems
Refer to Parts D for further inspection and testing requirements.

8.2.9 Civil works
Refer to Parts E for further inspection and testing requirements.

9.0 TESTS ON COMPLETION

9.1Completion Checks and Operation Procedure

The Contractor shall be responsible for the safe and efficient setting to work of the whole of the plant and equipment. The methods adopted shall be to the satisfaction of the Engineer on site and shall be in accordance with any safety and permit regulations in force by the Employer on the site.
The condition for allowing any plant or equipment to be operated is the successful test on completion documented by a duly completed and countersigned erection checklist.
The Contractor shall give sufficient detail in the commissioning program to satisfy the Engineer that the sequence and duration of the proposed setting to work activities are logical and realistic. Details of the Contractor's commissioning staff necessary to achieve the program shall be given.
At least three months before commencing the commissioning of any plant or equipment, the Contractor shall submit for approval fully comprehensive schedules of pre-commissioning checks applicable to each item of the plant and equipment provided. The schedules shall then be used during commissioning as a guide to the methods to be followed and to record the actual activities carried out with the appropriate date.
Each activity on the schedules, when completed to the satisfaction of the Engineer, shall be signed and dated by the Contractor and countersigned by the Engineer.
The Contractor shall also submit for approval schedules of commissioning procedures that he proposes to follow when bringing groups of plant items into service during the commissioning period. These schedules shall detail the tests necessary to ensure the complete and satisfactory commissioning of each section of plant and shall detail operational limitations. The schedules shall be used during commissioning, which shall only commence when the relevant check schedules have been completed.

The schedules shall be updated regularly by the Contractor and a revised copy submitted to the Engineer for approval.
Each activity on the commissioning procedure schedules, when completed to the satisfaction of the Engineer, shall be signed and dated by the Contractor and shall be countersigned by the Engineer.
The commissioning procedures shall ensure that the commissioning of any item of the works does not interrupt the normal operation of any previously commissioned item or any item to be commissioned jointly with equipment of other sections.
When the commissioning of any item or equipment of the section is complete and before the trial operation period is commenced, the Contractor shall carry out such preliminary tests as are necessary to establish that the plant is functioning correctly and efficiently, and shall make any adjustments required.
All test equipment, tools, materials, consumables, labour and spare parts required during commissioning shall be provided by the Contractor. Also the Contractor shall maintain adequate stock of consumables and spare parts at site to fulfil his contractual obligations during Defects Notification Period.
The Tests may be witnessed by or repeated in the presence of the inspection authority in order to obtain the required fitness certificates.
The Contractor shall supply all test equipment, lubricants and other material. The Contractor shall be responsible for providing test weights and materials and their disposal after the load test.

9.1.2 Materials

During the pre-commissioning and commissioning periods and for tests on completion, the Employer will provide the required steam for testing free of charge to the Contractor.
Provided that the permanent auxiliary power supply system for the plant auxiliaries is completed and energized, all subsequent electricity consumed for pre-commissioning, commissioning and tests on completion will be free of any charge to the Contractor.
The Contractor shall provide all other necessary material, apparatus and stores including any necessary spare parts.

9.1.3 Commissioning Management Structure

For Commissioning activities a Commissioning Management Team shall be formed. The Commissioning Management Team will include Engineering and Operations personnel representing the Employer as well as Technical personnel and Supervisors from the Contractor.

The charter of this team will be to safely coordinate the interfaces between Commissioning activities with a view to:

a) Ensuring safety of personnel
b) Ensuring safety of plant
c) Minimising commissioning time
d) Coordinate commissioning with the GPP

The Contractor shall coordinate this team.

9.1.4 Commissioning Workshop

A minimum of 3 months prior to the commencement of any commissioning activity on-site there shall be a workshop held to discuss and agree on procedures and timing for Tests on Completion. The workshop shall be attended by the Contractor's commissioning manager and his commissioning engineers, by the Employer, and by a GPP representative.

The workshop will include a review of:

a) Commissioning procedures,
b) Work Permit and HSE systems and procedures,
c) Scheduling, timing and cooperation amongst the various interested parties.

At least two 2 weeks prior to the workshop, the Contractor shall submit to the Employer the following documents, in draft form, for review. The workshop shall not commence until these documents have been modified to include any Employer's comments:

a) A detailed Gantt chart showing the timing of Tests on Completion activities on a system by system basis
b) Checklists and ITP's for Tests on Completion.
c) Commissioning procedures for each plant item and sub-system detailing proposed methods for all tests and inspections necessary to establish that the plant is functioning correctly and efficiently, and that all operational limitations are established.
d) Detailed procedures for acceptance and performance tests
e) Details on conformity to site safety rules

9.1.5 Staffing

During pre-commissioning the Contractor shall provide all necessary supervisory and operating staff. The only involvement of the Employer's staff will be in accordance with the training and instruction as defined elsewhere in this specification.

During the commissioning phase the Employer's operating staff will operate the relevant parts of the Work under the guidance of the Contractor's operating staff. During this phase, the operation and safety of the relevant part of the Work shall be the sole responsibility of the Contractor. Notwithstanding the provisions of the Conditions of Contract, that part shall not be deemed to have been taken-over by virtue of such operation by the Employer's operating staff.

The Contractor shall have satisfied himself as to the capability of the Employer's operators to carry out such operations as he may direct and shall remain responsible for the successful performance of such operations.

Throughout the whole of Commissioning Period the Contractor shall provide suitably qualified and experienced operating staff, who shall instruct the Employer's staff in the correct operating procedures.

The Contractor shall provide a team of suitably qualified and experienced engineers and technicians to pre-commission and commission the overall plant. The Contractor shall also ensure that a suitably qualified commissioning engineer from the respective major equipment manufacturer's own service organization shall visit the site to check the erection or installation of each significant plant item, and to supervise the commissioning of the plant item, until the basic functioning of the item has been demonstrated to the Engineer's satisfaction.

Competent Engineers shall be provided to overall supervise the mechanical, electrical, control & instrumentation, commissioning activities. The appointment of these Contractor's engineers shall be subject to the approval of the Engineer.

Subsequent to the issue of the Preliminary Acceptance Certificate for any part of the Work the Employer shall assume full responsibility for the operation thereof, but the Contractor shall retain on site a competent engineer to advise on all aspects of operation and to analyse performance. The competent engineer shall remain on site until the last unit is

commissioned. Should the Employer require to extend the time of stay of this engineer, this service shall be provided to him for up to a further six months.

At all times the Contractor shall ensure that his staff and any sub- contractor's or seconded staff observe all prescribed safety rules and permit systems.

9.2 Reporting

9.2.1 Incident Reports

From the date of commencement of the Tests on completion and until the expiration of the Defects Notification Period, all incidents shall be reported under an approved incident reporting system. Each unit or plant trip shall be logged in the DCS system. An incident is defined as any failure or interruption such as an unscheduled trip or inadvertent operator or maintenance action causing a trip, occurring in any portion of the plant covered by this Contract. Incident reports shall be submitted within 36 hours from time of occurrence.

All settings and changes in the set point list shall be recorded in the commissioning documentation added into the O&M Manual and shall become part of the final product manual of the Plant.

Control Systems Reports shall be submitted within 36 hours from time of change, or maintenance activity, or incident. Reports shall be sufficiently extensive to allow the Engineer to perceive the exact details of the occurrence and as a minimum shall include the part no. of the item and the reference drawing sheet no. and details of software where necessary. When extensive reports are not possible within 36 hours of the occurrence then a brief report shall be submitted firstly, followed in due course by a second subsequent report to provide the necessary elaboration. At the discretion of the Engineer meetings shall be held throughout the Contract to discuss and agree on any action arising from Control System Reports.

9.3 Pre-commissioning Tests

Procedures for all the calibrations, tests and pre-commissioning activities shall be submitted to the Employer for review and comments before implementation. The Contractor shall submit written notification of such activities prior to implementation.

The Contractor shall conduct all necessary pre-commissioning works of Plant equipment to ensure a safe, reliable and successful commissioning of the Plant. The Contractor shall prepare a comprehensive pre-commissioning procedures and checklist and submit to the Employer for review and acceptance.

The pre-commissioning works shall include but not limited to the following:

a) check each pipe or sector for correct installation of controls, instrumentation, valves, drains and vents against piping & instrumentation diagrams;
b) stroke all valves fully. Check, limit switches and positioners, where applicable;
c) check and adjust protective device and interlock settings;
d) check correct reliable functioning and calibration of all automatic controls, instrumentation, supervisory equipment and manual controls;
e) lubrication verification (both quantity and grade of lubricant);
f) check all bolting is correctly tightened;
g) flushing and cleaning of all pipes with temporary strainers;
h) check correct alignment of rotating equipment;
i) check correct setting/elevation of static equipment;
j) check all electrical equipment and connections prior to energization; and
k) installation of temporary pipe lines, and blinds
l) Hydrostatic pressure testing

9.3.1Cleaning of Steam Piping (Steam Purge)

The Contractor shall clean the Steamfield piping by carrying out a steam purge, and other cleaning techniques as appropriate. The steam purge shall completed in accordance with an appropriate standard (such as NEMA SM 23) or approved equivalent.

Steamfield piping will be progressively blown out in stages starting with the 2 phase systems and separators. The steam

blow shall be undertaken to obtain clean steam sufficient to satisfy the steam cleanliness requirements of the Menengai Power Plants. Target bars shall be used to test the cleanliness of the steam. Acceptance criteria shall be agreed upon and approved by the Employer

9.3.1.1 Steam Purge Procedure

The Steam Purge shall be carried out in accordance with the approved Testing Procedure, but as a minimum requirement shall include the following:

a) The steam purge cycle shall comprise high speed steam flow and thermal shocks by repeatedly providing high and low temperature states. Steam purging shall be carried out during normal working hours and pipes shall be allowed to cool during the night.

b) The steam purge cycle shall be not less than three consecutive days.

c) Pipe cleanliness tests shall be done immediately after satisfactory completion of the steam purge cycle. A polished copper target test piece shall be placed in the temporary discharge piping to check for the number, size and distribution of indentations in the test piece.

The test target shall be 25 mm in width and extend the full length of the discharge pipe. Triangular test targets may be used. The duration of each pipe cleanliness test shall be not less than 2 minutes.

Pipe cleanliness tests shall continue until three consecutive test pieces have each satisfied the following criteria:

1. Indentations shall be less than 0.5 mm in diameter.

The minimum purging steam velocity shall be not less than the maximum operating velocity such that the steam forces applied to any foreign matter in the pipeline are greater than the maximum operating forces. The Contractor shall state in the approved Testing Procedures the requisite purging velocities for the relevant pipe sizes.

The Contractor shall prepare a detailed procedure for all steam blowing, included the methodology for determining disturbance factors, and submit to the Employer for its approval before commencing steam blowing.

The procedure shall include details of all equipment used for the steam blow (including temporary steam blow pipework), the employer will conduct random internal inspections to confirm acceptable cleanliness.

No uncleaned upstream pipework shall be connected to previously cleaned downstream pipework.

9.3.2 Other Lines

All compressed air piping and tubing shall be blown clear. Main headers shall be blown to atmosphere individually with the air receiver installed. Pipe and tubing to individual instruments, actuators and controllers shall be blown clear by disconnecting air lines at each device.

9.3.3 Functional Tests

Following all pre-commissioning checks and tests, the Contractor shall perform functional tests on the Plant equipment or system. The functional tests shall demonstrate the proper start-up and operation of the equipment or system, under various operating conditions and prove that the equipment or system operates safely and reliably according to the design specifications, including safe shutdown during trip situation. Functional tests shall also be performed to replicate the pre-disassembly functional tests, for comparative purposes.

9.4 Commissioning Tests

Commissioning tests shall be carried out to demonstrate that the plant can perform, under the steady state and transient operating conditions required by the Specification.

These commissioning tests shall demonstrate both the technical suitability of the plant and its control equipment, and the methods recommended by the Contractor for the handling the operation of the plant.

The commissioning tests shall include tests to show that:

a) The plant may be started up and shut-down, in an economical and well- controlled manner, using the methods described in the Contractor's draft instruction manuals, without the use of any special or unusual skills on the part of the operators and without imposing any stress or loading on any plant item beyond that for which it is designed.

b) The plant may be shut-down satisfactorily under emergency conditions using the methods described in the Contractor's draft instruction manuals.

c) The plant may be run stable at any load within its design range, under automatic control.

d) The plant is capable of stable and continuous operation at rated and minimum output with the steamfield in operation under automatic control once on stream.

Commissioning Tests shall be conducted in 2 stages:

1. Standalone steamfield commissioning to confirm safe and reliable operation. This will include venting steam and demonstrating satisfactory pressure control and commissioning of the reinjection system.
2. Commissioning Tests in conjunction with power station commissioning.

Specific Steam field testing will include:

a. Full load test. Operate the Steamfield at Guarantee Case conditions for 8 hours, monitoring the steam flows and pressures and stability of the system

b. Part load tests. Demonstrate stable operation at 25%, 50%, 75% of Guarantee Case conditions, monitoring the steam flows and pressures and stability of the system

c. Load increase, ramping rate test

d. Load rejection test (from 25%, 50%, 75%, 100%, 110% or maximum continuous overload if greater than 110% to house load), including re-synchronization (of the Plant).

e. Load rejection test (from 100% load to 0% load)

f. Steam flow and pressure tests at all Design Cases

g. Demonstrate stable operation while operating with excess steam venting of at least 5% of steam flow

h. Demonstrate stable operation while operating with zero steam venting (Vent station zero flow)

i. Noise level tests

9.6 Trial Operation

After the unit optimization is completed, the Contractor shall confirm the successful completion in writing and the unit shall perform a 24 hours continuous Full Load Run operation under nominal conditions.

9.6.1 Initial Operation Tests

After completion of the trial run, the Contractor may apply for the initial operation tests. The trial run will be initiated by the end of the commissioning of the plant. During the commissioning of the steamfield all required tests on equipment shall be executed. If the commissioning is finished the steamfield may start with the reliability and trial run. Commissioning clearance certificates shall be approved by Employer/Engineer. The Initial Operation shall be done after the unit/plant optimization and before the Reliability Tests, respectively during the Plant Integration tests.

The Initial Operation is a demonstration of the steamfield operational behaviour under standard, extreme and special conditions. The initial operation program shall be prepared by the Contractor and approved by the Employer/Engineer. At least the following tests as well as tests, which may be required by the grid authority, shall be included.

- Startup times and conditions
- Changeover to standby under different conditions
- Operation in min/max conditions
- Trip/runback conditions
- Critical functional tests
- Operation in abnormal conditions
- Load variations

During the tests the characteristic values shall be continuously logged. For transient operating conditions the curves shall be recorded by the DCS with high resolution. The log sheets and curve prints shall be attached to the report with explanation of the events. The report shall be sent to the Employer/Engineer in the agreed amount of copies.

The Employer, upon successful completion of these tests, shall issue an initial operation test certificate.

9.7 Performance Tests

The Contractor shall complete the following performance tests as a minimum requirement:

a) Steam Pressure Stability

The Contractor shall demonstrate that the Steamfield complies with this specification for steam pressure stability.

9.7.1 Performance Test Conditions

The Contractor may shut down the Steamfield prior to the performance tests for cleaning and minor adjustments.

The Contractor shall calibrate all instruments used to demonstrate compliance with this specification within 30 days prior to the tests commencing. An accurate measurement of the site barometric pressure shall be made at the start of the performance tests.

The performance tests shall use geothermal fluid from the wells provided by the Employer. The Contractor shall operate and setup the geothermal wells to the satisfaction of the Engineer and the Employer's local operating staff.
Conditions shall be held steady during the tests, as safe operation permits.

Each test shall be for at least 4 (four) hours from the time that the plant reaches stable operation as determined by the Engineer. Manual measurements of the tests shall be conducted every 15 minutes, and SCADA readings shall be recorded at the instrument scan time, but not longer than at
10 seconds intervals.

The Contractor shall adjust any readings based on instrument correction factors, and then average the readings over the test period. The Engineer may reject any readings that are significantly different from the normal range.

The Contractor shall perform calculations to demonstrate that the measured values comply with this specification.

Where stable operation cannot be maintained for the duration of the test, the test shall be repeated.

9.7.2 Allowable Tolerance

The allowable tolerance for geothermal steam flow and pressure is 1.5% of the guaranteed values. This allows for the cumulative effect of all errors in instrumentation and instrument reading.

9.7.3 Procedure

Performance tests shall be carried out on Steamfield by the Contractor to determine the Steamfield performance as well as the performance of main plant components which shall be separately tested. The tests will be so arranged as to prove the performance guarantees given in the relevant schedules in the various parts.

In the event of any of the performance guarantees not being achieved the respective equipment or plant shall be made available to the Contractor for him to make good by modifying or replacing defective parts of his supply. To enable the Engineer to identify the individual item(s) of plant which is (are) causing the overall plant performance to fail to meet the guaranteed figure(s), the Contractor shall perform acceptance tests as required by the Engineer for any item of plant the Engineer suspects. Facilities shall therefore be provided on the plant for the installation of the Contractor's test instrumentation at the appropriate locations of the components and equipment to enable such acceptance tests to be performed. Such acceptance tests shall be carried out in accordance with the relevant standards which shall be subject to approval by the Engineer.

The Contractor shall submit for approval with his tender suitable correction formulae to enable the guaranteed figures to be adjusted should the average conditions during the test differ from those specified in the performance guarantee schedule. If the correction curves are submitted with the Proposal and are agreed by Employer/Engineer and thus will be part of the Contract Documents no further approval is necessary. If the curves may have to be modified at a later stage, than these curves are subject to the approval by Employer/Engineer.

The Contractor shall submit for approval to the Engineer three (3) months prior to completion of assembly and/or mechanical completion the detailed procedure for conducting the performance and acceptance tests. The procedure shall include the following for each test or group of tests:

1. The sequence of the tests to be conducted.
2. The time duration of each test at each load.
3. The number of test runs at each load.
4. A list of instruments that will be used for each test. The list shall define which instruments are (a) special test instruments, (b) certified, (c) to be calibrated before and after each test, (d) check instruments, (e) station supply instruments. A schematic diagram showing all test points cross- referenced to the instrument list shall be included.
5. All formulae, calculations, conversion factors, curves, correction curves etc., to be used in the conducting of the tests and the calculation of the test results.

6. Sample test reports or data sheets and all specific result sheet forms that will be used for the test.
7. Written procedure and description of conducting the test.

As soon as practicable after the satisfactory completion of the reliability tests, performance tests executed at site shall be carried out. The performance test is limited to that test being described and agreed in the performance test procedure in order to determine that the plant is in accordance with the Specification and Guarantees.

Prior to the tests under this clause the Contractor shall submit with the detailed procedure covering the testing to be undertaken and the methods to be employed. The detail areas of responsibility and items, which specifically require preparation and agreement before the tests, can be carried out.

All test instrumentation shall be supplied by the Contractor and shall be retained by him upon the satisfactory conclusion of all such tests at site unless otherwise specified in this contract.

All costs associated with the supply, calibration and installation of the test instrumentation shall be included in the Contract Price.

All test instruments shall be supplied with up-to-date calibration certificates issued by an independent testing laboratory.

The difference between the certification date and the actual Performance Test start date shall not be greater than 3 months. Where the installed plant instrumentation is used for the tests, calibration checks shall be conducted immediately prior to the tests and shall be witnessed by the Engineer.

The calibrations of all instruments required for guarantee measurements are to be re-checked within 1 month after the performance test. If significant errors are found the Engineer may call for the performance test to be repeated after such errors have been corrected. The Contractor may provide additional check instruments, with certified calibrations, as a back-up to the permanent instrumentation.

9.7.4 Test instrumentation

The method of measuring all quantities and qualities and the measurement tolerances shall be in accordance with the appropriate IEC, EN or other national standards that must be approved by the Engineer.

The definitive conditions required for establishing whether the guarantees are met shall be measured by precision test equipment to be installed by the Contractor in addition to the permanent measuring equipment supplied under the contract.

Where permanent measuring equipment has been installed to the requisite standard suitable for test purposes, this may at the discretion of the Engineer, be acceptable for acceptance and performance test measurements in conjunction with test differential pressure measuring equipment for the flow measurements.

The design of the components and equipment shall provide for the installation and use of the test equipment so as not to interfere with the plant loading or delay the guaranteed completion dates.

The precision test equipment used for the acceptance and performance tests shall be calibrated against standard instruments before the tests, and if required by the Engineer also after the tests. Calibration records shall be available for inspection by the Engineer.

Pressure gauges shall be calibrated against a certified dead weight tester.
The error of the pressure gauges shall not exceed 0.25% of their range at any indicated value.

Mercury columns and pressure gauges shall where possible be connected in such a way that no allowance for head of water has to be made. When the geodetic head in connecting piping contributes to the indicated pressure reading, a correction shall be applied.

For the measurements of temperature, thermocouples, mercury-in-steel or glass thermometers shall be used.

Thermocouples shall be calibrated at fixed points on the international temperature scale using primary or secondary points.

During the performance tests the milivolt output of test thermocouples shall be measured using high quality null-balance potentiometers with the cold junction of the thermocouple immersed in a mixture of melting ice and water.

Mercury-in-steel or glass thermometers shall be calibrated in a temperature controlled bath. The bath shall be continuously stirred and the temperature measured by an NPL calibrated thermometer or equivalent. The error for temperature measuring devices shall not exceed those given in the approved standards.

In cases where flow measurement is necessary for the acceptance tests, the measuring element and its installation must conform to the requirements of the relevant EN, ASME or British Standards. Calibration of flowmeters before installation shall be confined to a visual inspection of the orifice plate coupled to a check on dimensions and sharpness of the orifice. Readings shall also be taken of the pipe bore diameter at several representative points upstream of the orifice plate over a distance of not less than two pipe diameters immediately adjacent to the orifice plate.

The flow shall be calculated on the basis of the constants given in the relevant standards, taking into account all corrections such as viscosity, pipe roughness, lack of edge sharpness etc.
The total tolerance of the flow measurement shall be the root of the sum of the squares of all tolerances.

If the differential pressure is measured by instruments operating according to the force-balance principle, the standard accuracy class of these instruments shall be at least 0.5%. The calibration of the flow measuring instruments shall be in accordance with the following:

- The differential pressure transmitter shall be calibrated by applying a differential pressure to the process connections of the instrument
- The value of this differential pressure shall be measured by a mercury or water or other suitable liquid column depending on the range
- The transmitter output shall be measured by a standard device during calibration of the transducer. The device used to indicate or totalise the measured flow shall be calibrated separately against a standard test instrument.

Steam and water purity shall be determined by means of a conductivity meter calibrated against a known resistance connected across the measuring cell and temperature compensating cell terminals. The resistance used shall have a tolerance not exceeding 1%. Water samples shall be analysed by means of a flame photometer to determine the relationship between conductivity and total dissolved solids. The photometric analysis shall also determine the Na content and other dissolved solids content of the sample.

In cases where the electrical power consumption of an item of plant or the electrical power output is required to be measured, a high quality integrating watt-hour meter with an accuracy of class 0.5 shall be used.

It will be sufficient to produce maker’s test certificates for the integrating watt-hour meter, but should the measured value be disputed by either party a further calibration shall be performed.

All services required by the instruments, e.g. air and electricity supplies, shall be adjusted to the values required by the instrument manufacturer’s specification prior to the commencement of the acceptance and performance test and shall be kept at these values for the duration of the test.

During the design stage of the equipment the Contractor shall give details of measurements to be made to substantiate that the performance of the equipment meets the requirements of the specification, and in particular shall submit for approval a schedule of performance test instrumentation necessary to demonstrate the guarantees in the performance schedules in the various sections.

The test instrumentation schedule shall quote an appropriate test tolerance for each parameter, including the calorific value of the fuel, and an overall test tolerance for each guarantee value.

After commissioning and during the trial operation period, the Contractor shall test the main closed-loop control systems to demonstrate that the quality of control is within the guarantee limits specified in the corresponding section of this specification. The Contractor shall submit a comprehensive description of each test. This shall include the type and classification of all test equipment. In general such tests shall consist of step changes of a desired value with all important parameters being measured on high speed, multi trace recording devices, preferably of the UV type.

If these tests indicate that any part of the control and monitoring equipment does not perform in a satisfactory manner or is not able to meet the stated figures for overshoot or provide stable control, the Contractor shall improve the control equipment by suitable engineering measures, making full use of all theoretical and equipment engineering possibilities such as load- dependent parameter variation, feed forward of disturbance variable, improved optimization and modification of characteristic curves for control valves and actuators.

9.7.5 Environmental Tests
During the acceptance and performance tests the Contractor shall demonstrate to the satisfaction of the Engineer that the plant emission levels (noise, exhaust gas and waste water) do not exceed the acceptable levels specified in individual sections and as required by the local environmental requirements.

9.7.6 Records and Reports

During each performance and guarantee test run the relevant measuring values will be taken jointly by the Engineer and the Contractor.

After completion of a test run the data sheets will be jointly initialed and three
(3) copies distributed to each of the parties.

The Contractor has to compile the readings and results of sample analyses in a report presenting the results in graphs and tables and showing all necessary calculations and interpretation of the test results with respect to guarantee figures and performance particulars as given.

For each of the specified acceptance and performance tests the Contractor shall evaluate the test figures and within one month of the completion of the relevant test shall submit to the Engineer for review four copies of the test report containing a complete analysis of the test results. The Performance Test results will be evaluated in accordance to the Performance Test Procedures and is not subject to Engineers approval. All Parties involved will jointly sign the test results.

9.7.7 Performance Worse Than Guaranteed
After the measured or "as-run" test results have been corrected to the specified conditions, the corrected test results will be directly compared with the plant operation guarantee data provided elsewhere in this specification, to determine whether the contractual requirements have been met.

No "tolerance", "adjustment" or "correction" on the test results will be permitted, for instrumentation error or inaccuracy, the method of testing, or any other cause.

9.8 Warranty
The Contractor warrants during Defects Notification Period that all plant furnished and work performed under the Contract shall be free from defects in title, design, materials, and workmanship and shall conform in all respects to Technical Specifications and the terms of the Contract, and shall be new and of good quality, if no quality is specified. Employer shall also be entitled to, at no additional cost, the benefits of extended warranties for periods exceeding the Defects Notification Period which are received by Contractor from any of its Subcontractors.

Upon receipt by Contractor of written notice from Employer of any such defect or nonconformity in any such plant, the works or work during the Defects Notification Period, the defect or nonconformity except for normal wear and tear, shall be redesigned, repaired, or replaced by Contractor at a time acceptable to Employer. Contractor shall perform such tests as Employer may require verifying that such redesign, repairs, and replacements comply with the requirements of the Contract. All costs incidental to such redesign, repairs, replacement, and testing, including the removal, replacement, and reinstallation of equipment and materials necessary to gain access, shall be borne by Contractor. Contractor warrants such redesigned, repaired, or replaced works against defective design, materials, and workmanship for a period of 12 months from the date of such repair or replacement of works. Should Contractor fail to promptly make the necessary redesign, repairs, replacement, and tests, Employer may perform or cause to be performed the same at Contractor's expense. Contractor and its surety or sureties, if any, shall be liable for the satisfaction and full performance of the warranties as set forth therein.
The foregoing warrants are exclusive and in lieu of all other warranties whether written, oral or implied. There is no implied Warranty of Merchantability or Implied Warranty of Fitness for purpose.

PART H: PROPOSED WORK PLAN

The bidders to prepare a works program that fits in a contract of Twelve (12) months of practical completion of works. A bidder that does not provide for this program of works will be disqualified.

1.0TECHNICAL EVALUATION

2.1.1 Personnel

The bidder must demonstrate that it has the personnel for the key positions that meet the following requirements. The CVs for the proposed personnel should be provided. Please note that Total work experience means the total number of years worked since leaving school or college and similar experience means number of years while working on high pressure piping projects. **Documentary evidence e.g. Academic certificates and recommendation letters from Employers MUST be provided.**

No.	Position	Total Work Experience (Years)	Experience in Similar Works (Years)	Qualification Criteria Total Work Experience	Qualification criteria Similar Experience
1	*Project Manager*	At least fifteen (15) years total experience or equivalent as a manager in construction of civil and pipe line works	Including a minimum of ten (10) Years' experience as project manager of contracts for construction of cross county pressure pipelines and vessels. (Provide client letter of reference together with reputable contact person).	a)15 Years and above **2 marks** b) Between 5 and 10 Years **1marks** c) Between 1 and 5 years **0.5 mark**	a) Over 10 Years **2 marks** b) Between 5 and 10 years **1 marks** c) Between 1 and 5 Years **0.5 mark**
2	*Contractors Site Manager (to be Contractor's Representative on Site*	At least fifteen (15) years total experience or equivalent as a manager in construction of civil and pipe line works	Including a minimum of ten (10) Years' experience as project manager of contracts for construction of cross county pressure pipe lines and vessels. (Provide client letter of reference together with reputable	a)15 Years and above **2 marks** b) Between 5 and 10 Years **1 marks** c) Between 1 and 5 years **0.5 mark**	a) Over 10 Years **2 marks** b) Between 5 and 10 years **1 marks** c) Between 1 and 5 Years **0.5 mark**
3	Project Civil Engineer	At least ten (10) years total experience as a Site Engineer in civil works and pipe line installations	Including a minimum of eight (8) Years' experience in design and construction of civil and structural Works of similar nature. (Provide client letter of reference together with reputable Contact person).	a)10 years and above **2 Marks** b)Between 5 and 10 years **1 marks** c) Below 5 years **0.5 Mark**	a) 8 years and above **2 Marks** b) Between 4 and 8 years **1 mark** c) Less than 4 years **0.5 Mark**
4	Project Mechanical Engineer	With more than ten(10) years total experience in mechanical works	Including a minimum of eight (8) years' experience in installation and Construction of	a)10 years and above **2 Marks** b)Between 5 and 10 years **1**	a) 8 years and above **2 Marks** b) Between 4 and 8 years **1 mark**

		and pipe line installations Engineer	pressure pipe lines and vessels. (Provide client letter of reference together with reputable	**marks** c) Below 5 years **0.5 Mark**	c) Less than 4 Years **0.5 Mark**
5	Project Electrical, Instrumentation and Controls Engineer	With more than ten (10) years total experience as a site engineer in Electrical, Control & Instrumentation works	Including a minimum of eight (8) years' experience in design and Installation of Electrical, Control & Instrumentation systems. (Provide client letter of reference together with reputable Contact person).	a)10 years and above **2Marks** b)Between 5 and 10 years **1 marks** c) Below 5 years **0.5 Mark**	a)10 years and above **2 marks** b) Below 10 years – **0.5 marks**
6	*Health, Safety& Environment Officer*	With more than eight (8) (10) years total experience in Health and Safety in a Construction industry.	Including a minimum of four (4) years' experience as a safety officer for complex projects Of similar nature. (Provide client letter of reference together with reputable contact Person).	a)8 years and above **1 Mark** b) below 8 years **0.5 marks**	a) Above 4 years **1 Marks** b) Below 4 years – **0 marks**
7	*QA/QC Manager*	With more than eight (8) years total experience in the Construction industry.	Including a minimum of five (4) years experience as quality assurance officer for civil and pressure pipe Line projects. (Provide client letter of reference together with reputable contact Person).	a)8 years and above **1Mark** b) Below 8 years **0.5 Mark**	a) Above 4 years **1 Mark** b) Below 4 years **0 marks**
8	*Welding Inspector*	With more than ten (10) Years total experience in cross country pipelines.	Including a minimum of five (5) years' experience as a welding inspector for pressure pipelines. (Provide client letter of reference together with reputable Contact person).	a)8 years and above **2Mark** b) Below 8 years **0.5 Mark**	a)Above 4 years **2 Marks** b) Below 4 years – **0.5 marks**
9	*Testing and Commissioning Engineer*	With more than fifteen (15) years total experience or equivalent as	Including a minimum of ten (10) Years' experience as a testing and commissioning	a)15 Years and above **1 mark** b) Between 5 and 15 Years **0.5**	a) Over 10 Years **1 mark** b) Below 10

		an engineer in testing and commissioning of pressurized Vessels.	Engineer for geothermal steam gathering systems. (Provide client letter of reference together with reputable contact Person).	**Marks** c) Below 5 years **0 mark**	years – **0.5 mark**

Total maximum Marks for Personnel = 30 marks

2.1.2. Bidders/ Company's experience

Bidders must demonstrate their experience in high pressure piping and pressure vessels. Give evidence of either **certificate of completion** of such a job or previous client's **recommendation letter** on a similar job. Any forged documentation will be detected, and the bidder disqualified from further evaluation.

No.	**Experience in Installation of High-pressure piping and Pressure Vessel**	**Relevant Experience in geothermal Steamfield Installation**	**Experience in installation of High-pressure piping and pressure Vessel**	**Relevant experience in Steam field Installation**
1	A minimum of 2 No. Project and maximum of 4 No. and above which involve high pressure piping, and pressure vessels completed in the last 10 years	At least 1 No. Project in Geothermal Steam field Installation that has a separator or equivalent high pressure vessel.	a) Above 4 Projects – **10marks** b) 4 Projects – **7.5marks** c) 3 projects– **5 marks** d) 2 projects – **2.5 marks**	1 No. Project in Geothermal Steam field installation that has a separator or equivalent high-pressure vessel = **20 marks** Geothermal Steam field installation but without separator or equivalent high-pressure vessel **-10 marks** No geothermal Steam field installation– **0** marks

Total marks on the Company's experience = 30 marks.

2.1.3 Availability of Key Construction equipment.

The bidder must demonstrate availability of the following equipment

No.	Equipment type and characteristics	Required No.	Qualification criteria
1	Mobile Crane	1No.	2 Marks
2	Concrete batching plant	1No.	3 Marks
3	Hydraulic excavator at least 232 Horsepower	1No.	1Mark
4	Mobile concrete mixer. Minimum capacity $4M^3$	1No.	1 Mark
5	Mobile Generator minimum 50 KVA	2 No.	1 Mark
6	Welding machines at least 50 KVA	2No.	2Mark

7	Vibrating steel drum rollers	2No.	1Mark
8	Piling rig	1No.	3Mark
9	Radiographic equipment set for weld joint inspection.	1No.	1Mark

Total Marks for Equipment = 15 Marks

2.1.3 Methodology of project execution and program of works

The Bidder must demonstrate understanding of the project scope by submitting methodology of execution of the works covering all aspect of installations and the proposed program of works. Methodology will include but not limited to the following;

No.	Description	Qualification Criteria
1	Work procedures including Civil, Mechanical, Electrical, Instrumentation and control and inspection of testing	3 marks
2	Proposed program of works	3 Marks
3	Health, safety and quality procedures while executing the woks	2 marks
4	Inclusion of tools, equipment and personnel required for every process of executing the works	2 Marks

Total marks for Methodology = 10marks.

2.1.4 Manufacturer Authorization Forms and Brochures

The bidders to provide manufacturers authorization of the following items.

- Pipes and all their fittings – The manufacturer must have relevant valid API certification to manufacture the pipes and fittings – attach API certificate. - **1 mark**
- Pressure vessels (Provide evidence of ASME approved facility/ workshop in which the vessels will be fabricated). - **1 mark**
- Flow meters - **1 mark**
- Instruments - **1 mark**
- Gate Valves - **1 mark**

Please note that the Manufacturer's authorizations must be authentic, any forged documents will lead to disqualification of the bidder.

The bidders to provide brochures, catalogues or technical data and **highlight** the items listed below as per the technical specifications and price schedule. If the bidder does not highlight any of the items below as per the technical schedule and price schedule, then he will be disqualified.

- Pipes and all their fittings - **2 marks**
- Valves - **2 marks**
- Steam traps - **2 marks**
- Rapture discs - **2 marks**
- Flow meters (two-phase, steam and brine) - **2 marks**

T I: PRICE SCHEDULES/BILL OF QUANTITIES

1.0 Preamble

The Price Schedules shall be read in conjunction with the Instructions to Bidders, General and Particular Conditions of Contract and the Employer's Requirement and **Technical Specifications**

The contractor will apply for payment after every two months the Engineers will evaluate the works done and advise the contractor to invoice the agreed amount.

The Schedules may not generally give a full description of the works to be performed and the materials or equipment to be supplied under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item to filling the rates and prices.

A rate or price shall be entered against each item in the priced Price Schedules, whether quantities are stated or not. The cost of Items against which the Bidder has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Price Schedules.

The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Price Schedules, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

To the extent acceptable to the Employer for the purposes of making payments or partial payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor may provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.

The Provisional Sums included and so designated in the Price Schedules shall be expended in whole or in part at the direction and discretion of the Engineer.

Contingency amount shall only be spent on extra works which will arise in the process of executing the contract. If such works does not arise or only part of it is spend, the whole amount or the remainder will be considered a saving on the part of the Employer.

During execution of the works quantities will be remeasured to ensure that payment in done on work done.

The price schedule will be read together with the specifications and drawings provided.

For PCs sums and contingency, the technical schedule of rates will be used to determine the price of works, which will be quantified in the process of execution of the works.

PRICE SCHEDULE (1) FOR PRELIMINARIES

A	**Preliminaries based on the following items**				
item	**description**	**qty**	**units**	**Unit price (KES)**	**Total price (KES)**
1	Mobilization	Item	item		
2	Standard and equipped site office	item	item		
3	Performance bond	item	item		
4	All relevant insurance pertaining the project	item	item		
5	Seeking for relevant licenses and approvals from relevant authorities	item	item		
6	Third party inspections where applicable	tem	item		
7	Compliance to health and safety requirements	item	item		
8	Compliance to KFS rules	item	item		
9	Maintenance and operation manuals	item	item		
10	Laydown area and storage of materials	item	item		
11	Electricity water and other utilities to be used for construction.	item	item		
12	Security	item	item		
13	Demobilization	item	item		
14	Any other	item	item		

PRICE SCHEDULE (2) MECHANICAL INSTALLATION WORKS

ITEM	DESCRIPTION	AMOUNT (KES)
A	TOTAL FOR TWO PHASE PIPELINE AND VALVES FOR WELL MW-09B	
B	TOTAL FOR TWO PHASE PIPELINE AND VALVES FOR WELL MW-10B	
C	TOTAL FOR TWO PHASE PIPELINE AND VALVES FOR WELL MW-13B	
D	TOTAL FOR TWO PHASE PIPELINE AND VALVES FOR WELL MW-19B	
E	TOTAL FOR TWO PHASE PIPELINE AND VALVES RELOCATION FOR WELL MW-17A	
F	TOTAL FOR BRINE PIPELINE AND VALVES FROM SEPARATOR SS7 TO TIE-IN	
G	TOTAL FOR FLASH TANK FOR WELL MW-19B	
H	TOTAL FOR TWO PHASE PIPELINE AND VALVES, SEPARATORS, SILENCERS, STEAM & BRINE LINES FOR MW-36	
I	TOTAL FOR TWO PHASE PIPELINE AND VALVES, SEPARATORS, SILENCERS, STEAM & BRINE LINES FOR MW-37	
J	TOTAL FOR TWO PHASE PIPELINE AND VALVES, SEPARATORS, SILENCERS, STEAM & BRINE LINES FOR MW-38	
K	TOTAL FOR TWO BRINE PIPELINE AND VALVES, SILENCERS, WEIRBOX FOR MW-07 CONNECTION	
L	TOTAL FOR TWO BRINE PIPELINE AND VALVES, SILENCERS, WEIRBOX FOR MW-22 CONNECTION	
M	TOTALS FOR ANY OTHER MECHANICAL WORKS	
	TOTAL FOR MECHANICAL INSTALLATION WORKS	

PRICE SCHEDULE (3) ELECTRICAL, INSTRUMENTATION AND CONTROL INSTALLATION WORKS

ITEM	DESCRIPTION	AMOUNT (KES)
A	TOTAL FOR ELECTRICAL I&C FOR WELL MW-09B	
B	TOTAL FOR ELECTRICAL I&C FOR WELL MW-10B	
C	TOTAL FOR ELECTRICAL I&C FOR WELL MW-13B	
D	TOTAL FOR ELECTRICAL I&C FOR WELL MW-19B	
E	TOTAL FOR ELECTRICAL I&C RELOCATION FOR WELL MW-17A	
F	TOTAL FOR ELECTRICAL I&C FOR SEPARATOR SS7 BRINE LINE	
G	TOTAL FOR ELECTRICAL I&C INTERGRATION TO EXISTING SCADA SYSTEM	
H	TOTAL FOR ELECTRICAL I&C FOR WELL MW-38 AND SS9	
I	TOTAL FOR ELECTRICAL I&C FOR WELL MW-36 AND SS4	
J	TOTAL FOR ELECTRICAL I&C FOR WELL MW-37 AND SS8	
K	TOTAL FOR ELECTRICAL I&C FOR WELL MW-07	
L	TOTAL FOR ELECTRICAL I&C FOR WELL MW-22	
M	TOTAL FOR INTERFACING TWO OTHER IPPs	
N	TOTAL FOR ANY OTHER ELECTRICAL I&C WORKS	
	TOTAL FOR ELECREICAL I&C INSTALLATION WORKS	

PRICE SHEDULE (4) CIVIL WORKS

ITEM	DESCRIPTION	AMOUNT (KES)
A	TOTAL FOR CIVIL WORKS FOR WELL MW-09B	
B	TOTAL FOR CIVIL WORKS FOR WELL MW-10B	
C	TOTAL FOR CIVIL WORKS FOR WELL MW-13B	
D	TOTAL FOR CIVIL WORKS WELL MW-19B	
E	TOTAL FOR CIVIL WORKS FOR WELL MW-17A RELOCATION	
F	TOTAL FOR CIVIL WORKS FOR SEPARATOR SS7 BRINE LINE	
G	TOTAL FOR CIVIL WORKS WELL MW-38 AND SS9	
I	TOTAL FOR CIVIL WORKS WELL MW-37 AND SS4	
J	TOTAL FOR CIVIL WORKS WELL MW-36 AND SS8	
K	TOTAL FOR CIVIL WORKS WELL MW-07	
L	TOTAL FOR CIVIL WORKS WELL MW-22	
M	TOTAL FOR ANY OTHER CIVIL WORKS	
~	TOTAL FOR CIVIL WORKS	

PRICE SCHEDULE (5) SERVICES

item	description	qty	units	unit price (KES)	Total price dpp (KES)
	SERVICES				
1	PRELIMINARIES	1	ITEM		
2	SURVEYING SERVICES	1	ITEM		
3	NON-DESTRUCTIVE TESTING – 100 % RADIOGRAPHY OF WELDED JOINTS	1	ITEM		
4	FACTORY ACCEPTANCE TEST FOR THE 1. FLASHTANK 2. PIPES 3. VALVES 4. SEPARATORS 5. FLOW METERS	1	ITEM		
5	LAPTOPS AS SPECIFIED IN THE TENDER	5	NO.		
6	SOFTWARE AS SPECIFIED IN THE TENDER	1	ITEM		
7	TRAINING AS SPECIFIED IN THE TENDER	1	ITEM		
8	CODES AND STANDARDS AS SPECIFIED IN THE TENDER IN PDF FORMAT IN PDF FORM	1	ITEM		
9	ENGINEERING	1	ITEM		
10	PROJECT VEHICLES	3	NO		
11	TESTING & COMMISSIOINNG	1	ITEM		
12	ANY OTHER SERVICE				
TOTAL FOR SERVICES					

SUMMARY PAGE FOR PRICE SCHEDULES

item	DESCRIPTION	Total Price DPP (KES)
1	PRICE SCHEDULE NO. 1: PRELIMINARIES	
2	PRICE SCHEDULE NO. 2: MECHANICAL INSTALLATION	
3	PRICE SCHEDULE NO. 3: ELECTRICAL INSTRUMENTATION & CONTROL INSTALLATION	
4	PRICE SCHEDULE NO.4: civils INSTALLATION WORKS	
5	PRICE SCHEDULE NO.5: SERVICES	
TOTAL		
TAXES		
GRAND TOTAL FOR ENGINEERING, SUPPLY OF MATERIALS TO SITE, INSTALLATION WORKS, TESTING AND COMMISSIONING OF WORKS AND HAND OVER OF PROJECT TO THE EMPLOYER INCLUSIVE OF ALL TAXES.		

Tenderers Name _____

Tenderer's Signature _____

Tenderer's Rubber Stamp _____

PART III - THE CONDITIONS OF CONTRACT AND CONTRACT FORMS

SECTION VIII - GENERAL CONDITIONS OF CONTRACT (GCC)

[Name of Procuring Entity] [Name

of Contract] [Project Manager's

Name and Address] **General**

Conditions of Contract

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1. GENERAL PROVISIONS

1.1 Definitions-

In this Contract, except where context otherwise requires, the following terms shall be interpreted as indicated below. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

"Accepted Contract Amount" means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.

"Bill of Quantities" means the priced and completed Bill of Quantities forming part of the

tender. **"Completion Date"** means the date of completion of the Works as certified by the

Project Manager.

"Contract" means the agreement entered into between the Procuring Entity and the Contractor as recorded in the Agreement Form and signed by the parties including all attachments and appendices thereto and all documents incorporated by reference therein to execute, complete, and maintain the Works.

"Contractor" means the person(s) named as contractor in the Form of Tender accepted by the Procuring Entity.

"Particular Conditions of Contract" means the pages completed by the Procuring Entity entitled Particular Conditions of Contract which constitute Part A of the Particular Conditions.

"Contractor's Documents" means the calculations, computer programs and other software, progress reports, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.

"Contractor's Equipment" means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor's Equipment excludes Temporary Works, Procuring Entity's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.

"Contract Price" means the price defined in the contract and thereafter as adjusted in accordance with the provisions of the Contract.

"Contractor's Personnel" means the Contractor's Representative and all personnel whom the Contractor utilizes on Site, who may include the staff, labor and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works.

"Contractor's Representative" means the person named by the Contractor in the Contract or appointed from time to time by the Contractor who acts on behalf of the Contractor.

"Cost" means expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.

"Day" means a calendar day and **"year"** means 365 days.

"Day works" means Work inputs subject to payment on a time basis for labor and the associated materials and plant.

"Defects Notification Period" means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause11.1 [Completion of Outstanding Work and Remedying Defects], which extends over the days stated in the Particular Conditions of Contract.

"Defects Liability Period" means the period named in the Particular Conditions of Contract and calculated from the Completion Date, within which the contractor is liable for any defects that may develop in the handed over works.

"Defect" means any part of the Works not completed in accordance with the Contract.

"Defects Liability Certificate" means the certificate issued by Project Manager upon correction of defects by the Contractor.

"Drawings" means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Procuring Entity in accordance with the Contract.

"Procuring Entity" means the Procuring Entity named as Procuring Entity in the Particular Conditions of Contract.

"Procuring Entity's Personnel" means the Project Manager, the Project Manager, the assistants and all other staff, labor and other employees of the Project Manager and of the Procuring Entity; and any other personnel notified to the Contractor, by the Procuring Entity or the Project Manager, as Procuring Entity's Personnel.

"Procuring Entity's Equipment" means the apparatus, machinery and vehicles (if any) made available by the Procuring Entity for the use of the Contractor in the execution of the Works, as stated in the Specification; but does not include Plant which has not been taken over by the Procuring Entity.

"Project Manager" means 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

"Final Payment Certificate" means the payment certificate issued under Sub-Clause 14.13 [Issue of Final Payment Certificate].

"Final Statement" means the statement defined in Sub-Clause 14.11 [Application for Final

Payment Certificate]. **"Force Majeure"** is defined in Clause19 [Force Majeure].

"Foreign Currency" means a currency of another country (not Kenya) in which part (or all) of the Contract Price is payable, but not the Local Currency.

"Goods" means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

"Interim Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment], other than the Final Payment Certificate.

"Laws" means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.

"Letter of Acceptance" means the letter of formal acceptance, signed by the Procuring Entity, including any annexed memoranda comprising agreements between and signed by both Parties.

"Local Currency" means the currency of Kenya.

"Materials" means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

"Notice of Dissatisfaction" means the notice given by either Party to the other under Sub-Clause 20.3 indicating its dissatisfaction and intention to commence arbitration.

"Party" means the Procuring Entity or the Contractor, as the context requires.

"Payment Certificate" means a payment certificate issued under Clause 14 [Contract Price and Payment].

"Performance Security" means the security (or securities, if any) under Sub-Clause 4.2 [Performance Security]. **"Performance Certificate"** means the certificate issued under Sub-Clause 11.9 [Performance Certificate]. **"Permanent Works"** means the permanent works to be executed by the Contractor under the Contract.

"Plant" means the apparatus, machinery and other equipment intended to form or forming part of the Permanent Works, including vehicles purchased for the Procuring Entity and relating to the construction or operation of the Works.

"Provisional Sum" means a sum (if any) which is specified in the Contract as a provisional sum, for the execution of any part of the Works or for the supply of Plant, Materials or services under Sub-Clause 13.5 [Provisional Sums].

"Project Manager" is the person named in the Appendix to Conditions of Contract (or any other competent person appointed by the Procuring Entity and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract and shall be an "Architect" or a "Quantity Surveyor" registered under the Architects and Quantity Surveyors Act Cap 525 or an "Project Manager" registered under Project Managers Registration Act Cap 530.

"Retention Money" means the accumulated retention moneys which the Procuring Entity retains under Sub-Clause 14.3 [Application for Interim Payment Certificates] and pays under Sub-Clause 14.9 [Payment of Retention Money].

"Schedules" means the document (s) entitled schedules, completed by the Contractor and submitted with the Form of Tender, as included in the Contract.

"Section" means a part of the Works specified in the Particular Conditions of Contract as a Section (if any)

"Site" means the places where the Permanent Works are to be executed, including storage and working areas, and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.

"Site Investigation Reports" are those reports that may be included in the tendering documents which are factual and interpretative about the surface and subsurface conditions at the Site.

"Specification" means the document entitled specification, as included in the Contract, and any

additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.

"Statement" means a statement submitted by the Contractor as part of an application, under Clause 14 [Contract Price and Payment], for a payment certificate.

"Start Date" or "Commencement Date" is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with the Site possession date(s).

"Subcontractor" means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works.

"Taking-Over Certificate" means a certificate issued under Clause 10 [Procuring Entity's Taking Over].

"Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

"Tender" means the Form of Tender and all other documents which the Contractor submitted with the Form of Tender, as included in the Contract.

"Tests on Completion" means the tests which are specified in the Contractor agreed by both Parties or instructed as a Variation, and which are carried out under Clause 9 [Tests on Completion] before the Works or a Section (as the case maybe) are taken over by the Procuring Entity.

"Tests after Completion" means the tests (if any) which are specified in the Contract and which are carried out in accordance with the Specification after the Works or a Section (as the case may be) are taken over by the Procuring Entity.

"Time for Completion" means the time for completing the Works or a Section (as the case may be) as stated in the Particular Conditions of Contract (with any extension calculated from the Commencement Date.

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

"Unforeseeable" means not reasonably foreseeable by an experienced contractor by the Base Date.

"Variation" means any change to the Works, which is instructed or approved as a variation under Clause 13 [Variations and Adjustments].

"Works" means the items the Procuring Entity requires the Contractor to construct, install, and turnover to the Procuring Entity, as defined in the Appendix to Conditions of Contract. **"Works" may** also mean the Permanent Works and the Temporary Works, or either of them as appropriate.

1.2 Interpretation

In the Contract, except where the context requires otherwise:

a) Words indicating one gender include all genders;

b) words indicating the singular also include the plural and words indicating the plural also include the singular;

c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing;

d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record; and

e) The marginal words and other headings shall not be taken in to consideration in the interpretation of these Conditions.

1.3 Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:

a) In writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Particular Conditions of Contract; and

b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Particular Conditions of Contract. However:

   i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and

   ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.

Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Project Manager, a copy shall be sent to the Project Manager or the other Party, as the case may be.

1.4 Law and Language

1.4.1 The Contract shall be governed by the laws of **Kenya.**

1.4.2 The ruling language of the Contract shall be **English.**

1.5 Priority of Documents

1.5.1 The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

a) The Contract Agreement,

b) The Letter of Acceptance,

c) The Form of Tender,

d) The Particular Conditions–Part A,

e) The Particular Conditions–Part B

f) These General Conditions of Contract

g) The Specifications

h) the Drawings, and

i) the Schedules and any other documents forming part of the Contract.

If an ambiguity or discrepancy is found in the documents, the Project Manager shall issue any necessary clarification or instruction.

1.5.1 Prior to commencing construction works, the Contractor shall prepare and submit to the Procuring Entity for approval drawings and specifications (including Bills of Quantities, (if need be) which will guide on the contract works to be carried out The Specifications shall be prepared taking the following Notes for preparing Specifications.

Specifications

1. Specifications must be drafted to present a clear and precise statement of the required standards of materials, and workmanship to the requirements of the Procuring Entity. The Specifications should require that all materials, plant, and other supplies to be permanently incorporated in the Works be new, unused, of the most recent or current models, and incorporating all recent improvements in design and materials unless provided otherwise in the Contract.

2. Specifications from previous similar projects are useful and may not be necessary to re-write specifications for every Works Contract.

3. There are considerable advantages in standardizing **General Specifications** for repetitive Works in recognized public sectors, such as highways, urban housing, irrigation and water supply. The General Specifications should cover all classes of workmanship, materials and equipment commonly involved in constructions, although not necessarily to be used in a particular works contract. Deletions or addenda should then adapt the General Specifications to the particular Works.

4. Care must be taken in drafting Specifications to ensure they are not restrictive. In the Specifications of standards for materials, plant and workmanship, existing Kenya Standards should be used as much as possible, otherwise recognized international standards may also be used.

5. The Procuring Entity should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly) alternatives are possible to the technical solutions indicated in tender documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential tenderers.

6. The Contractor should provide a description of the selected parts of the Works with appropriate reference to Drawings, Specifications, Bills of Quantities, and Design or Performance criteria, stating that the alternative solutions shall be at least structurally and functionally equivalent to the basic design parameters and Specifications.

7. Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Procuring Entity, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details. Technical alternatives permitted in this manner shall be considered by the Procuring Entity each on its own merits and independently of whether the contractor has priced the item as described in his design included with the contract documents.

1.6 Contract Agreement

The Parties shall enter into a Contract Agreement within 28 days after the Contractor receives the Letter of Acceptance, unless the Particular Conditions establish otherwise. The Contract Agreement shall be based upon the form annexed to the Particular Conditions. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Procuring Entity.

1.7 Assignment

Neither Party shall assign the whole or any part of the Contractor any benefit or interest in or under the Contract. However, either Party:

a) May as sign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party, and

b) may, as security in favor of a bank or financial institution, assign its right to any moneys due,

or to become due, under the Contract.

1.8 Care and Supply of Documents

1.8.1 The Specifications and Drawings shall be in the custody and care of the Procuring Entity. Unless otherwise stated in the Contract, two copies of the Contract and of each subsequent Drawings and Bills of Quantities shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.

1.8.2 Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Procuring Entity. Unless otherwise stated in the Contract, the Contractor shall supply to the Project Manager two copies of each of the Contractor's Documents.

1.8.3 The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract.TheProcuringEntity'sPersonnelshallhavetherightofaccesstoallthesedocumentsatallreasonable times.

1.8.4 If a Party become saw are of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

1.9 Delayed Instructions

1.9.1 TheContractorshallgivenoticetotheProjectManagerwhenevertheWorksarelikelytobedelayedordisrupted if any necessary instruction is not issued to the Contractor within a particular time, which shall be reasonable. The notice shall include details of the necessary instruction, details of why and by when it should be issued, and the nature and amount of the delay or disruption likely to be suffered if it is late.

1.9.2 If the Contractor suffers delay and/or incurs Cost as a result of a failure of the Project Manager to issue the notified instruction within a time which is reasonable and is specified in the notice with supporting details, the Contractor shall give a further notice to the Project Manager and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such Cost-plus profit, which shall be included in the Contract Price.

1.9.3 After receiving this further notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

1.9.4 However, if and to the extent that the Project Manager's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

1.10. Procuring Entity's Use of Contractor's Documents

1.10.1 As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

1.10.2 The Contractor shall be deemed (by signing the Contract) to give to the Procuring Entity a non-terminable transferable non-exclusive royalty-free license to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This license shall:

a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,

b) entitle any person in proper possession of the relevant part of the Works to copy, use and

communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and

c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

1.10.3 The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the ProcuringEntityforpurposesotherthanthosepermittedunderSub-Clause1.10.2.

1.11. Contractor's Use of Procuring Entity's Documents

1.11.1 As between the Parties, the Procuring Entity shall retain the copyright and other intellectual property rights in the Specification, the Drawings and other documents made by (or on behalf of) the Procuring Entity. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Procuring Entity's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

1.12 Confidential Details

1.12.1 The Contractor's and the Procuring Entity's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify compliance with the Contract and allow its proper implementation.

1.12.2 The Contractor's and the Procuring Entity's Personnel shall also treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.

1.13 Compliance with Laws

1.131 The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Particular Conditions:

a) The Procuring Entity shall have obtained (or shall obtain) the planning, zoning, building permit or similar permission for the Permanent Works, and any other permissions described in the Specifications as having been (or to be) obtained by the Procuring Entity; and the Procuring Entity shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and

b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Procuring Entity harmless against and from the consequences of any failure to do so, unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence.

1.14 Joint and Several Liability

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons:

a) These persons shall be deemed to be jointly and severally liable to the Procuring Entity for the performance of the Contract;

b) these persons shall notify the Procuring Entity of their leader who shall have authority to bind

the Contractor and each of these persons; and

c) the Contractor shall not alter its composition or legal status without the prior consent of the Procuring Entity.

1.15 Inspections and Audit by the Procuring Entity

Pursuant to paragraph 2.2 e. of Appendix B to the General Conditions, the Contractor shall permit and shall cause its subcontractors and sub-consultants to permit, the Public Procurement Regulatory Authority, Procuring Entity and/or persons appointed or designated by the Government of Kenya 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 the Procuring Entity if requested by the Procuring Entity. The Contractor's and its Subcontractors' and sub-consultants' attention is drawn to Sub-Clause 15.6 (Fraud and Corruption) which provides, inter alia, that acts intended to materially impede the exercise of the Procuring Entity's inspection and audit rights constitute a prohibited practice subject to contract termination (as well as to a determination of in eligibility pursuant to the Procuring Entity's prevailing sanctions procedures).

2. THE PROCURING ENTITY

2.1 Right of Access to the Site

2.2 The Procuring Entity shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the **Particular Conditions of Contract.** The right and possession may not be exclusive to the Contractor. If, under the Contract, the Procuring Entity is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Procuring Entity shall do so in the time and manner stated in the Specification. However, the Procuring Entity may withhold any such right or possession until the Performance Security has been received.

2.3 If no such time is stated in the Particular Conditions of Contract, the Procuring Entity shall give the Contractor right of access to, and possession of, the Site within such times as required to enable the Contractor to proceed without disruption in accordance with the programme submitted under Sub-Clause 8.3 [Programme].

2.4 If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Procuring Entity to give any such right or possession within such time, the Contractor shall give notice to the Project Manager and shall be entitled subject to Sub-Clause20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such Cost-plus profit, which shall be included in the Contract Price.

2.5 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

2.6 However, if and to the extent that the Procuring Entity's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

2.2. Permits, Licenses or Approvals

2.2.1 The Procuring Entity shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to obtain properly:

a) Copies of the Laws of Kenya which are relevant to the Contract but are not readily available, and

b) Any permits, licenses or approvals required by the Laws of Kenya:

i) Which the Contractor is required to obtain under Sub-Clause1.13[Compliance with Laws],

ii) For the delivery of Goods, including clearance through customs, and

iii) For the export of Contractor's Equipment when it is removed from the Site.

2.3 Procuring Entity's Personnel

2.31 The Procuring Entity shall be responsible for ensuring that the Procuring Entity's Personnel and the Procuring Entity's other contractors on the Site:

a) co-operate with the Contractor's efforts under Sub-Clause4.6 [Co-operation], and

b) take actions similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-Clause 4.8[Safety Procedures]and under Sub-Clause 4.18 [Protection of the Environment].

2.4 Procuring Entity's Financial Arrangements

The Procuring Entity shall submit, before the Commencement Date and thereafter within 28days after receiving any request from the Contractor, reasonable evidence that financial arrangements have been made and are being maintained which will enable the Procuring Entity to pay the Contract Price punctually (as estimated at that time) in accordance with Clause 14 [Contract Price and Payment]. Before the Procuring Entity makes any material change to his financial arrangements, the Procuring Entity shall give notice to the Contractor with detailed particulars.

2.5 Procuring Entity's Claims

2.5.1 If the Procuring Entity considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Procuring Entity or the Project Manager shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Procuring Entity's Equipment and Free-Issue Materials], or for other services requested by the Contractor.

2.5.2 The notice shall be given as soon as practicable and no longer than 28 days after the Procuring Entity became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

2.5.3 The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/ or extension to which the Procuring Entity considers himself to be entitled in connection with the Contract. The Project Manager shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Procuring Entity is entitled to be paid by the Contractor, and/ or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 [Extension of Defects Notification Period].

2.5.4 This amount may be included as a deduction in the Contract Price and Payment Certificates. The Procuring Entity shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

3. The Project Manager

3.1 Project Manager's Duties and Authority

3.1.1 The Procuring Entity shall appoint the Project Manager who shall carry out the duties assigned to him

in the Contract. The Project Manager's staff shall include suitably qualified Assistants and other professionals who are competent to carry out these duties. The Project Manager's Name and Address shall be provided in the **Particular Conditions of Contract.**

3.1.2 The Project Manager shall have no authority to amend the Contract.

3.1.3 The Project Manager may exercise the authority attributable to the Project Manager as specified in or necessarily to be implied from the Contract. If the Project Manager is required to obtain the approval of the Procuring Entity before exercising a specified authority, the requirements shall be as stated in the Particular Conditions. The Procuring Entity shall promptly inform the Contractor of any change to the authority attributed to the Project Manager.

3.1.4 However, whenever the Project Manager exercises a specified authority for which the Procuring Entity's approval is required, then (for the purposes of the Contract) the Procuring Entity shall be deemed to have given approval.

3.1.5 Except as otherwise stated in these Conditions:

a) Whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Project Manager shall be deemed to act for the Procuring Entity;

b) The Project Manager has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract;

c) Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Project Manager (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances; and

d) any act by the Project Manager in response to a Contractor's request except as otherwise expressly specified shall be notified in writing to the Contractor within 28days of receipt.

3.1.6 The following provisions shall apply:

The Project Manager shall obtain the specific approval of the Procuring Entity before acting under the-following Sub-Clauses of these Conditions:

a) Sub-Clause 4.12: agreeing or determining an extension of time and / or additional cost.

b) Sub-Clause 13.1: instructing a Variation, except;

i) In an emergency situation as determined by the Project Manager, or

ii) if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the **Particular Conditions of Contract.**

c) Sub-Clause13.3: Approving a proposal for Variation submitted by the Contractor in accordance with Sub Clause13.1or13.2.

a) Sub-Clause13.4: Specifying the amount payable in each of the applicable currencies.

3.1.7 Notwithstanding the obligation, asset out above, to obtain approval, if, in the opinion of the Project Manager, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Project Manager, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Procuring Entity, with any such instruction of the Project Manager. The Project Manager shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause13 and shall notify the Contractor accordingly, with a copy to the Procuring Entity.

3.2 Delegation by the Project Manager

3.2.1 The Project Manager may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident Project Manager, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Project Manager shall not delegate the authority to determine any matter in accordance with Sub-Clause3.5 [Determinations].

3.3.2 Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Project Manager. However:

b) Any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Project Manager to reject the work, Plant or Materials;

c) If the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Project Manager, who shall promptly confirm, reverse or vary the determination or instruction.

3.3 Instructions of the Project Manager

3.3.1 The Project Manager may issue to the Contractor (at any time) instructions and additional or modified Drawings which may be necessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Project Manager, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause13[Variations and Adjustments] shall apply.

3.3.2 The Contractor shall comply with the instructions given by the Project Manager or delegated assistant, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing. If the Project Manager or a delegated assistant:

d) Gives an oral instruction,

e) receives a written confirmation of the instruction, from (or on behalf of) the Contractor, within two working days after giving the instruction, and

f) does not reply by issuing a written rejection and/ or instruction within two working days after receiving the confirmation, then the confirmation shall constitute the written instruction of the Project Manager or delegated assistant (as the case may be).

3.4 Replacement of the Project Manager

If the Procuring Entity intends to replace the Project Manager, the Procuring Entity shall, not less than 21 days before the intended date of replacement, give notice to the Contractor of the name, address and relevant experience of the intended replacement Project Manager. If the Contractor considers the intended replacement Project Manager to be unsuitable, he has the right to raise objection against him by notice to the Procuring Entity, with supporting particulars, and the Procuring Entity shall give full and fair consideration to this objection.

3.5 Determinations

3.51 Whenever these Conditions provide that the Project Manager shall proceed in accordance with this Sub-Clause 3.5 to agree or determine any matter, the Project Manager shall consult with each Party in an

endeavor to r each agreement. If agreement is not achieved, the Project Manager shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

3.5.2 The Project Manager shall give notice to both Parties of each agreement or determination, with supporting particulars, within 28 days from the receipt of the corresponding claim or request except when otherwise specified. Each Party shall give effect to each agreement or determination unless and until revised under Clause 20 [Claims, Disputes and Arbitration].

4. The Contractor

4.1 Contractor's General Obligations

4.1 The Contractor shall design (to the extent specified in the Contract), execute and complete the Works in accordance with the Contract and with the Project Manager's instructions, and shall remedy any defects in the Works.

4.1.1 The Contractor shall provide the Plant and Contractor's Documents specified in the Contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects.

4.1.2 All equipment, material, and services to be incorporated in or required for the Works shall have their origin in any eligible source country.

4.1.3 The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (I) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item of Plant and Materials as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the design or specification of the Permanent Works.

4.1.4 The Contractor shall, whenever required by the Project Manager, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Project Manager.

4.1.5 If the Contract specifies that the Contractor shall design any part of the Permanent Works, then unless otherwise stated in the Particular Conditions:

a) The Contractor shall submit to the Project Manager the Contractor's Documents for this part in accordance with the procedures specified in the Contract;

b) These Contractor's Documents shall be in accordance with the Specification and Drawings, shall be written in the language for communications defined in Sub-Clause 1.4 [Law and Language], and shall include additional information required by the Project Manager to add to the Drawings for co-ordination of each Party's designs;

c) The Contractor shall be responsible for this part and it shall, when the Works are completed, befit for such purposes for which the part is intended as are specified in the Contract; and

d) prior to the commencement of the Tests on Completion, the Contractor shall submit to the Project Manager the “as-built” documents and, if applicable, operation and maintenance manuals in accordance with the Specification and in sufficient detail for the Procuring Entity to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered to be completed for the purposes of taking-over under Sub-Clause10.1[Taking Over of the Works and Sections] until these documents and manuals have been submitted to the Project Manager.

4.2 Performance Security

4.2.1 The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the amount stated in the **Particular Conditions of Contract** and denominated in the currency (I e s) of the Contract or in a freely convertible currency acceptable to the Procuring Entity. If an amount is not stated in the Particular Conditions of Contract, this Sub-Clause shall not apply.

4.2.2 The Contractor shall deliver the Performance Security to the Procuring Entity within 28days after receiving the Letter of Acceptance, and shall send a copy to the Project Manager. The Performance Security shall be issued by a reputable bank selected by the Contractor, and shall be in the form annexed to the Particular Conditions, as stipulated by the Procuring Entity in the Particular Conditions of Contract, or in another form approved by the Procuring Entity.

4.2.3 The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contract or has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

4.2.4 The Procuring Entity shall not make a claim under the Performance Security, except for amounts to which the Procuring Entity is entitled under the Contract.

4.2.5 The Procuring Entity shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Procuring Entity was not entitled to make the claim.

4.2.6 The Procuring Entity shall return the Performance Security to the Contractor within 14 days after receiving a copy of the Taking-Over Certificate.

4.2.7 Without limitation to the provisions of the rest of this Sub-Clause, whenever the Project Manager determines an addition or a reduction to the Contract Price as a result of a change in cost and/ or legislation, or as a result of a Variation, amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor shall at the Project Manager's request promptly increase, or may decrease, as the case may be, the value of the Performance Security in that currency by an equal percentage.

4.3 Contractor's Representative

4.3.1 The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract. The Contractor's Representative's Name and Address shall be provided in the **Particular Conditions of Contract.**

4.3.2 Unless the Contractor's Representative **is named in the Contract**, the Contractor shall, prior to the Commencement Date, submit to the Project Manager for consent the name and particulars of the person the Contract or proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked in terms of Sub-Clause 6.9 [Contractor's Personnel], or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

4.3.3 The Contractor shall not, without the prior consent of the Project Manager, revoke the appointment of the Contractor's Representative or appoint a replacement.

4.3.4 The whole time of the Contractor's Representative shall be given to directing the Contractor's performance of the Contract. If the Contractor's Representative is to be temporarily absent from the Site during the execution of the Works, a suitable replacement person shall be appointed, subject to the Project Manager's prior consent, and the Project Manager shall be notified accordingly.

4.3.5 The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-

Clause3.3 [Instructions of the Project Manager].

4.3.6 The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Project Manager has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

4.3.7 The Contractor's Representative shall be fluent in the language for communications defined in Sub-Clause1.4 [Law and Language]. If the Contractor's Representative's delegates are not fluent in the said language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Project Manager.

4.4 Subcontractors

4.4.1 The Contractor shall not subcontractor sublet the whole of the Works.

4.4.1 The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. Unless otherwise stated in the Particular Conditions:

e) The Contractor shall not be required to obtain consent to suppliers solely of Materials, or to a subcontract for which the Subcontractor is named in the Contract;

f) The prior consent of the Project Manager shall be obtained to other proposed Subcontractors;

g) the Contractor shall give the Project Manager not less than 28 days' notice of the intended date of the commencement of each Subcontractor's work, and of the commencement of such work on the Site; and

h) each subcontract shall include provisions which would entitle the Procuring Entity to require the subcontract to be assigned to the Procuring Entity under Sub-Clause 4.5 [Assignment of Benefit of Subcontract] (I for when applicable) or in the event of termination under Sub-Clause15.2 [Termination by Procuring Entity].

4.4.3 The Contractor shall ensure that the requirements imposed on the Contractor by Sub-Clause1.12 [Confidential Details] apply equally to each Subcontractor.

4.4.4 Where practicable, the Contractor shall give fair and reasonable opportunity for contractors from Kenya to be appointed as Subcontractors.

4.5 Assignment of Benefit of Subcontract

4.5.1 If a Subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period and the Project Manager, prior to this date, instructs the Contractor to assign the benefit of such obligations to the procuring Entity, then the Contractor shall do so. Unless otherwise stated in the assignment, the Contractor shall have no liability to the Procuring Entity for the work carried out by the Subcontractor after the assignment takes effect.

4.6 Co-operation

4.6.1 The Contractor shall, as specified in the Contract or as instructed by the Project Manager, allow appropriate opportunities for carrying out work to:

i) The Procuring Entity's Personnel,

j) Any other contractors employed by the Procuring Entity, and

k) The personnel of any legally constituted public authorities, who may be employed in the execution on or near the Site of any work not included in the Contract.

4.6.2 Any such instruction shall constitute a Variation if and to the extent that it causes the Contractor to

suffer delays and/or to incur Unforeseeable Cost. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

4.6.3 If, under the Contract, the Procuring Entity is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractor's Documents, the Contractor shall submit such documents to the Project Manager in the time and manner stated in the Specification.

4.7 Setting Out

4.7.1 The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contractor notified by the Project Manager. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

4.7.2 The Procuring Entity shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

4.7.3 If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Project Manager and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

l) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

m) payment of any such Cost-plus profit, which shall be included in the Contract Price.

4.7.4 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this.

4.8 Safety Procedures

4.8.1 The Contractor shall:

a) Comply with all applicable safety regulations,

b) Take care for the safety of all persons entitled to be on the Site,

c) Use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,

d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10 [Procuring Entity's Taking Over], and

e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

4.9 Quality Assurance

4.9.1 The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Project Manager shall be titled to audit any aspect of the system.

4.9.2 Details of all procedures and compliance documents shall be submitted to the Project Manager for information before each design and execution stage is commenced. When any document of a technical

nature is issued to the Project Manager, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

4.9.3 Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.10 Site Data

4.10.1 The Procuring Entity shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Procuring Entity's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Procuring Entity shall similarly make available to the Contractor all such data which come into the Procuring Entity's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

4.10.1 To the extent which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

n) The form and nature of the Site, including sub-surface conditions,

o) The hydrological and climatic conditions,

p) The extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,

q) The Laws, procedures and labor practices of Kenya, and

r) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

4.11 Sufficiency of the Accepted Contract Amount

4.11.1 The Contractor shall be deemed to:

s) Have satisfied himself as to the correctness and sufficiency of the Accepted Contract Amount, and

t) have based the Accepted Contract Amount on the data, interpretations, necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.10 [Site Data].

4.11.2 Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper execution and completion of the Works and the remedying of any defects.

4.12 Unforeseeable Physical Conditions

4.12.1 In this Sub-Clause, “physical conditions” means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions.

4.12.2 If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Project Manager as soon as practicable.

4.12.3 This notice shall describe the physical conditions, so that they can be inspected by the Project Manager, and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Project Manager may give. If an instruction constitutes a Variation, Clause13 [Variations and Adjustments]

shall apply.

4.12.4 If and to the extent that the Contractor encounters physical conditions which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be titled subject to notice under Sub-Clause 20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such Cost, which shall be included in the Contract Price.

4.12.5 Upon receiving such notice and inspecting and/or investigating these physical conditions, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

4.12.6 However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Project Manager may also review whether other physical conditions in similar parts of the Works (if any) were more favorable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favorable conditions were encountered, the Project Manager may proceed in accordance with Sub- Clause 3.5 [Determinations] to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under sub-paragraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in the Contract Price.

4.12.7 The Project Manager shall take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender, which shall be made available by the Contractor, but shall not be bound by the Contractor's interpretation of any such evidence.

4.13 Rights of Way and Facilities

Unless otherwise specified in the Contract the Procuring Entity shall provide effective access to and possession of the Site including special and/or temporary rights-of-way which are necessary for the Works. The Contractor shall obtain, at his risk and cost, any additional rights of way or facilities outside the Site which he may require for the purposes of the Works.

4.14 Avoidance of Interference

4.14.5 The Contractor shall not interfere unnecessarily or improperly with:

a) The convenience of the public, or

b) The access to and use and occupation of all roads and foot paths, irrespective of whether they are public or in the possession of the Procuring Entity or of others.

4.14.6 The Contractor shall indemnify and hold the Procuring Entity harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

4.15 Access Route

4.15.5 The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site at Base Date. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

4.15.6 Except as otherwise stated in these Conditions:

a) The Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes;

b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;

c) the Procuring Entity shall not be responsible for any claims which may arise from the use or otherwise of any access route;

d) the Procuring Entity does not guarantee the suitability or availability of particular access routes; and

e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.16 Transport of Goods

Unless otherwise stated in the Particular Conditions:

a) The Contractor shall give the Project Manager not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and
c) the Contractor shall indemnify and hold the Procuring Entity harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

4.17 Contractor's Equipment

The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any major items of Contractor's Equipment without the consent of the Project Manager. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.

4.18 Protection of the Environment

4.18.5 The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

4.18.6 The Contractor shall ensure that missions, surface discharges and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.

4.19 Electricity, Water and Gas

4.19.5 The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require for his construction activities and to the extent defined in the Specifications, for the tests.

4.19.6 The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details and prices are given in the Specifications. The Contractor shall, at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.

4.19.7 The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined by the Project Manager in accordance with Sub-Clause 2.5 [Procuring Entity's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Procuring Entity.

4.20 Procuring Entity's Equipment and Free-Issue Materials

4.20.5 The Procuring Entity shall make the Procuring Entity's Equipment (if any) available for the use of the

Contractor in the execution of the Works in accordance with the details, arrangements and prices stated in the Specification. Unless otherwise stated in the Specification:

a) The Procuring Entity shall be responsible for the Procuring Entity's Equipment, except that

b) the Contractor shall be responsible for each item of Procuring Entity's Equipment whilst any of the Contractor's Personnel is operating it, driving it, directing it or in possession or control of it.

4.20.6 The appropriate quantities and the amounts due (at such stated prices) for the use of Procuring Entity's Equipment shall be agreed or determined by the Project Manager in accordance with Sub-Clause 2.5 [Procuring Entity's Claims] and Sub-Clause 3.5 [Determinations]. The Contractor shall pay these amounts to the Procuring Entity.

4.20.7 The Procuring Entity shall supply, free of charge, the "free-issue materials" (if any) in accordance with the details stated in the Specification. The Procuring Entity shall, at his risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them, and shall promptly give notice to the Project Manager of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Procuring Entity shall immediately rectify the notified shortage, defect or default.

4.20.8 After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor. The Contractor's obligations of inspection, care, custody and control shall not relieve the Procuring Entity of liability for any shortage, defect or default not apparent from a visual inspection.

4.21 Progress Reports

4.21.1 Unless otherwise stated in the Particular Conditions, monthly progress reports shall be prepared by the Contractor and submitted to the Project Manager in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates.

4.21.2 Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works. Each report shall include:

a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),

b) photographs showing the status of manufacture and of progress on the Site;

c) for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:

   i) commencement of manufacture,

   ii) Contractor's inspections,

   iii) tests, and

   iv) shipment and arrival at the Site;

d) the details described in Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment];

e) copies of quality assurance documents, test results and certificates of Materials;

f) list of notices given under Sub-Clause 2.5 [Procuring Entity's Claims] and notices given under Sub- Clause 20.1[Contractor's Claims];

g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and

h) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

4.22 Security of the Site

Unless otherwise stated in the Particular Conditions:

a) The Contractor shall be responsible for keeping un authorized persons off the Site, and

b) Authorized persons shall be limited to the Contractor's Personnel and the Procuring Entity's Personnel; and to any other personnel notified to the Contractor, by the Procuring Entity or the Project Manager, as authorized personnel of the Procuring Entity's other contractors on the Site.

4.23 Contractor's Operations on Site

4.23.1 The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Project Manager as additional working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.

4.23.2 During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.

4.23.2 Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfil obligations under the Contract.

4.24 Fossils

4.24.1 All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Procuring Entity. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

4.24.2 The Contractor shall, upon discovery of any such finding, promptly give notice to the Project Manager, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Project Manager and shall be entitled subject to Sub-Clause20.1[Contractor's Claims] to:

i) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

j) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Project Manager shall proceed in accordance with Sub-Clause3.5 [Determinations] to agree or determine these matters.

5 Nominated Subcontractors

5.1 Definition of "nominated Subcontractor"

In the Contract, "nominated Subcontractor" means a Subcontractor:

a) Who is stated in the Contract as being a nominated Subcontractor, or

b) whom the Project Manager, under Clause 13 [Variations and Adjustments], instructs the Contractor to employ as a Subcontractor subject to Sub-Clause 5.2 [Objection to Notification].

5.2 Objection to Nomination

The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Project Manager as soon as practicable, with supporting particulars. An objection shall be deemed reasonable if it arises from (among other things) any of the following matters, unless the Procuring Entity agrees in writing to indemnify the Contractor against and from the consequences of the matter:

a) there are reasons to believe that the Subcontractor does not have sufficient competence, resources or financial strength;

b) the nominated Subcontractor does not accept to indemnify the Contractor against and from any negligence or misuse of Goods by the nominated Subcontractor, his agents and employees; or

c) the nominated Subcontractor does not accept to enter into a subcontract which specifies that, for the subcontracted work (including design, if any), the nominated Subcontractor shall:

i) undertake to the Contractor such obligations and liabilities as will enable the Contractor to discharge his obligations and liabilities under the Contract;

ii) indemnify the Contractor against and from all obligations and liabilities arising under or in connection with the Contract and from the consequences of any failure by the Subcontractor to perform these obligations or to fulfil these liabilities, and

iii) be paid only if and when the Contractor has received from the Procuring Entity payments for sums due under the Subcontract referred to under Sub-Clause5.3[Payment to nominated Subcontractors].

5.3 Payments to nominated Subcontractors

The Contractor shall pay to the nominated Subcontractor the amounts shown on the nominated Subcontractor's invoices approved by the Contractor which the Project Manager certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with sub- paragraph (b) of Sub-Clause 13.5 [Provisional Sums], except as stated in Sub-Clause 5.4 [Evidence of Payments].

5.4 Evidence of Payments

5.4.1 Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Project Manager may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:

a) Submits this reasonable evidence to the Project Manager, or

b) i) satisfies the Project Manager in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts, and

ii) submits to the Project Manager reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement, then the Procuring Entity may (at his sole discretion) pay, direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above. The Contractor shall then repay, to the Procuring Entity, the amount which the nominated Subcontractor was directly paid by the Procuring Entity.

6. Staff and Labour

6.1 Engagement of Staff and Labour

6.1.1 Except as otherwise stated in the Specification, the Contractor shall decide for the engagement of all staff and labor, local or otherwise, and for their payment, feeding, transport, and, when appropriate, housing. The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labor with appropriate qualifications and experience from sources with in Kenya.

6.2 Rates of Wages and Conditions of Labour

6.2.1 The Contractor shall pay rates of wages, and observe conditions of labor, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by Procuring Entities whose trade or industry is similar to that of the Contractor.

6.2.2 The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in Kenya in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the Laws of Kenya for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws.\

6.3 Persons in the Service of Procuring Entity

The Contractor shall not recruit, or attempt to recruit, staff and Labour from amongst the Procuring Entity's Personnel.

6.4 Labour Laws

6.4.1 The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

6.4.2 The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

6.5 Working Hours

No work shall be carried out on the Site on locally recognized days of rest, or outside the normal working hours stated in the **Particular Conditions of Contract**, unless:

a) Otherwise stated in the Contract,

b) The Project Manager gives consent, or

c) The work is un avoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Project Manager.

6.6 Facilities for Staff and Labour

Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Procuring Entity's Personnel as stated in the Specifications. The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

6.7 Health and Safety

6.7.1 The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the

Site and at any accommodation for Contractor's and Procuring Entity's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

6.7.2 The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

6.7.3 The Contractor shall send, to the Project Manager, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Project Manager may reasonably require.

6.7.4 The Contractor shall conduct an awareness programmed on HIV and other sexually transmitted diseases via an approved service provider, and shall undertake such other measures as are specified in this Contract to reduce the risk of the transfer of these diseases between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals.

6.8 Contractor's Superintendence

6.8.1 Throughout the execution of the Works, and as long thereafter as is necessary to fulfil the Contractor's obligations, the Contractor shall provide all necessary super in tendencies to plan, arrange, direct, manage, inspect and test the work.

6.8.2 Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.4 [Law and Language]) and of the operations to be carried out (including the methods and techniques required, the hazards likely to been countered and methods of preventing accidents), for the satisfactory and safe execution of the Works.

6.9 Contractor's Personnel

6.9.1 The Contractor's Personnel shall be appropriately qualified, skilled and experienced in the irrespective trades or occupations. The Contractors Key personnel shall be named in the **Particular Conditions of Contract**. The Project Manager may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

a) Persists in any misconduct or lack of care,

b) Carries out duties incompetently or negligently,

c) Fails to conform with any provisions of the Contract,

d) Persists in any conduct which is prejudicial to safety, health, or the protection of the environment, or

e) based on reasonable evidence, is determined to have engaged in Fraud and Corruption during the execution of the Works.

6.9.2 If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

6.10 Records of Contractor's Personnel and Equipment

The Contractor shall submit, to the Project Manager, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Project Manager, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-

Over Certificate for the Works.

6.11 Disorderly Conduct

The Contractor shall a tall times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

6.12 Foreign Personnel

6.12.1 The Contractor may bring into Kenya any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence vis as and work permits. The Procuring Entity will, if requested by the Contractor, use his Lowest endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national or government permission required for bringing in the Contractor's personnel.

6.12.2 The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in Kenya of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

6.13 Supply of Water

The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.

6.14 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce the danger to their health. The Contractor shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

6.15 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Laws of Kenya, on site, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereof by Contractor's Personnel.

6.16 Prohibition of Forced or Compulsory Labour

The Contractor shall not employ forced labour, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

6.17 Prohibition of Harmful Child Labour

The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where the relevant labour laws of Kenya have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18years shall not be employed in dangerous work.

6.18 Employment Records of Workers

The Contractor shall keep complete and accurate records of the employment of labour at the Site.

The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Project Manager. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment].

6.19 Workers' Organizations

The Contractor shall comply with the relevant labour laws that recognize workers' rights to form and to join workers' organizations of their choosing without interference.

6.20 Non-Discrimination and Equal Opportunity

The Contractor shall base the labour employment on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline.

7 Plant, Materials and Workmanship

7.1 Manner of Execution

The Contractor shall carryout the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works:

a) In the manner (if any) specified in the Contract,

b) In a proper work man like and careful manner, in accordance with recognized good practice, and

c) with properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract.

7.2 Samples

The Contractor shall submit the following samples of Materials, and relevant information, to the Project Manager for consent prior to using the Materials in or for the Works:

a) manufacturer's standard samples of Materials and samples specified in the Contract, all at the Contractor's cost, and

b) additional samples instructed by the Project Manager as a Variation.

Each sample shall be labelled as to origin and intended use in the Works.

7.3 Inspection

7.3.1 The Procuring Entity's Personnel shall at all reasonable times:

a) Have full access to all parts of the Site and to all places from which natural Materials are being obtained, and

b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

7.3.2 The Contractor shall give the Procuring Entity's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

7.3.3 The Contractor shall give notice to the Project Manager whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Project Manager shall then

either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Project Manager does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Project Manager, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

7.4 Testing

7.4.1 This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

7.4.2 Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labor, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Project Manager, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

7.4.3 The Project Manager may, under Clause 13 [Variations and Adjustments], vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

7.4.4 The Project Manager shall give the Contractor not less than 24hours' notice of the Project Manager's intention to attend the tests. If the Project Manager does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Project Manager, and the tests shall then be deemed to have been made in the Project Manager's presence.

7.4.5 If the Contractor suffers delay and/ or incurs Cost from complying with these instructions or as a result of a delay for which the Procuring Entity is responsible, the Contractor shall give notice to the Project Manager and shall been titled subject to Sub-Clause20.1 [Contractor's Claims] to:

a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b) payment of any such Cost-plus profit, which shall be included in the Contract Price.

7.4.6 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

7.4.7 The Contractor shall promptly forward to the Project Manager duly certified reports of the tests. When the specified tests have been passed, the Project Manager shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Project Manager has not attended the tests, he shall be deemed to have accepted the readings as accurate.

7.5 Rejection

7.5.1 If, as a result of an examination, inspection, measurement or testing, any Plant, Materials or workmanship is found to be defective or otherwise not in accordance with the Contract, the Project Manager may reject the Plant, Materials or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract.

7.5.2 If the Project Manager requires this Plant, Materials or workmanship to be retested, the tests shall be repeated under the same terms and conditions. If the rejection and retesting cause the Procuring Entity to incur additional costs, the Contractor shall subject to Sub-Clause2.5 [Procuring Entity's Claims] pay these costs to the Procuring Entity.

7.6 Remedial Work

7.6.1 Notwithstanding any previous test or certification, the Project Manager may instruct the Contractor to:

a) Remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,

b) remove and re-execute any other work which is not in accordance with the Contract, and

c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.

7.6.2 The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under sub-paragraph(c).

7.6.3 If the Contractor fails to comply with the instruction, the Procuring Entity shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.5 [Procuring Entity's Claims] pay to the Procuring Entity all costs arising from this failure.

7.7 Ownership of Plant and Materials

7.7.1 Except as otherwise provided in the Contract, each item of Plant and Materials shall become the property of the Procuring Entity at whichever is the earlier of the following times, free from liens and other encumbrances:

a) When it is incorporated in the Works;

b) when the Contractor is paid the corresponding value of the Plant and Materials under Sub-Clause 8.10 [Payment for Plant and Materials in Event of Suspension].

7.8 Royalties

Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other payments for:

a) Natural Materials obtained from outside the Site, and

b) The disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal are as within the Site are specified in the Contract.

8 Commencement, Delays and Suspension

8.1 Commencement of Works

8.1.1 Except as otherwise specified in the Particular Conditions of Contract, the Commencement Date shall be the date at which the following precedent conditions have all been fulfilled and the Project Manager's notification recording the agreement of both Parties on such fulfilment and instructing to commence the Work is received by the Contractor:

a. Signature of the Contract Agreement by both Parties, and if required, approval of the Contract by relevant authorities of Kenya;

b. Delivery to the Contractor of reasonable evidence of the Procuring Entity's financial arrangements (under Sub-Clause2.4 [Procuring Entity's Financial Arrangements]);

c. Except if otherwise specified in the Particular Conditions of Contract, effective access to and possession of the Site given to the Contractor together with such permission(s) under (a) of Sub-Clause1.13 [Compliance with Laws] as required for the commencement of the Works

d. Receipt by the Contractor of the Advance Payment under Sub-Clause14.2 [Advance Payment] provided that the corresponding bank guarantee has been delivered by the Contractor.

8.1.2 If the said Project Manager's instruction is not received by the Contractor within 180 days from his receipt of the Letter of Acceptance, the Contractor shall be entitled to terminate the Contract under Sub-Clause 16.2 [Termination by Contractor].

8.1.3 The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date, and shall then proceed with the Works with due expedition and without delay.

8.2 Time for Completion

The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

a) Achieving the passing of the Tests on Completion, and

b) Completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 [Taking Over of the Works and Sections].

8.3 Programme

8.3.1 The Contractor shall submit a detailed time programme to the Project Manager within 28 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]. The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:

a. The order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing,

b. each of these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors]),

c. the sequence and timing of inspections and tests specified in the Contract, and

d. a supporting report which includes:

i. a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and

ii. details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.

8.3.2 Unless the Project Manager, within 21days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Procuring Entity's Personnel shall be entitled to rely upon the programme when planning their activities.

8.3.3 The Contractor shall promptly give notice to the Project Manager of specific probable future events or circumstances which may adversely affect the work, increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/ or a proposal under Sub-Clause13.3[Variation Procedure].

8.3.4 If, at any time, the Project Manager gives notice to the Contractor that a programme fails (to the extent

stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Project Manager in accordance with this Sub-Clause.

8.4 Extension of Time for Completion

8.4.1 The Contractor shall be entitled subject to Sub-Clause20.1 [Contractor's Claims] to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause10.1 [Taking Over of the Works and Sections] is or will be delayed by any of the following causes:

a. a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the Contract,

b. a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,

c. exceptionally adverse climatic conditions,

d. Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions, or

e. any delay, impediment or prevention caused by or attributable to the Procuring Entity, the Procuring Entity's Personnel, or the Procuring Entity's other contractors.

8.4.2 If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Project Manager in accordance with Sub-Clause 20.1 [Contractor's Claims]. When determining each extension of time under Sub-Clause 20.1, the Project Manager shall review previous determinations and may increase, but shall not decrease, the total extension of time.

8.5 Delays Caused by Authorities

If the following conditions apply, namely:

a) The Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in Kenya,

b) These authorities delay or disrupt the Contractor's work, and

c) The delay or disruption was Unforeseeable, then this delay or disruption will be considered as a cause of delay under sub-paragraph (b) of Sub-Clause 8.4 [Extension of Time for Completion].

8.6 Rate of Progress

8.6.1 If, at any time:

a. Actual progress is too slow to complete within the Time for Completion, and/or

b. Progress has fallen (or will fall) behind the current programme under Sub-Clause8.3 [Programme], other than as a result of a cause listed in Sub-Clause8.4 [Extension of Time for Completion], then the Project Manager may instruct the Contractor to submit, under Sub-Clause8.3 [Programme], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

8.6.2 Unless the Project Manager notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Procuring Entity to incur additional costs, the Contractor shall subject to notice under Sub-Clause 2.5 [Procuring Entity's Claims] pay these costs to the Procuring Entity, in addition to delay damages (if any) under Sub-Clause8.7 below.

8.6.3 Additional costs of revised methods including acceleration measures, instructed by the Project Manager to reduce delays resulting from causes listed under Sub-Clause8.4 [Extension of Time for Completion] shall be paid by the Procuring Entity, without generating, however, any other additional payment benefit to the Contractor.

8.7 Delay Damages

8.7.1 If the Contractor fails to comply with Sub-Clause 8.2 [Time for Completion], the Contractor shall subject to notice under Sub-Clause 2.5 [Procuring Entity's Claims] pay delay damages to the Procuring Entity for this default. These delay damages shall be the sum stated in the **Particular Conditions of Contract**, which shall be paid for every day which shall elapse between the relevant Time for Completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Particular Conditions of Contract.

8.7.2 These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Sub-Clause 15.2 [Termination by Procuring Entity] prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.

8.8 Suspension of Work

8.8.1 The Project Manager may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage.

8.8.2 The Project Manager may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clauses 8.9, 8.10 and 8.11 shall not apply.

8.9 Consequences of Suspension

8.9.1 If the Contractor suffers delay and/or incurs Cost from complying with the Project Manager's instructions under Sub-Clause 8.8 [Suspension of Work] and/or from resuming the work, the Contractor shall give notice to the Project Manager and shall been titled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a. an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b. payment of any such Cost, which shall be included in the Contract Price.

8.9.2 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

8.9.3 The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause8.8 [Suspension of Work].

8.10 Payment for Plant and Materials in Event of Suspension

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Plant and/or Materials which have not been delivered to Site, if:

a) The work on Plant or delivery of Plant and/or Materials has been suspended for more than28 days, and

b) the Contractor has marked the Plant and/or Materials as the Procuring Entity's property in accordance with the Project Manager's instructions.

8.11 Prolonged Suspension

If the suspension under Sub-Clause 8.8 [Suspension of Work] has continued for more than 84 days, the Contractor may request the Project Manager's permission to proceed. If the Project Manager does not give permission within 28 days after being requested to do so, the Contractor may, by giving notice to the Project Manager, treat the suspension as an omission under Clause13 [Variations and Adjustments] of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause16.2 [Termination by Contractor].

8.12 Resumption of Work

After the permission or instruction to proceed is given, the Contractor and the Project Manager shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension after receiving from the Project Manager an instruction to this effect under Clause 13 [Variations and Adjustments].

9 Tests on Completion

9.1 Contractor's Obligations

9.1.1 The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4 [Testing], after providing the documents in accordance with sub-paragraph (d) of Sub-Clause4.1[Contractor's General Obligations].

9.1.2 The Contractor shall give to the Project Manager not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 days after this date, on such day or days as the Project Manager shall instruct.

9.1.3 In considering the results of the Tests on Completion, the Project Manager shall make allowances for the effect of any use of the Works by the Procuring Entity on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the results of these Tests to the Project Manager.

9.2 Delayed Tests

9.2.1 If the Tests on Completion are being unduly delayed by the Procuring Entity, Sub-Clause 7.4 [Testing] (fifth paragraph) and/or Sub-Clause10.3 [Interference with Tests on Completion] shall be applicable.

9.2.2 If the Tests on Completion are being unduly delayed by the Contractor, the Project Manager may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Tests on such day or days within that period as the Contractor may fix and of which he shall give notice to the Project Manager.

9.2.3 If the Contractor fails to carry out the Tests on Completion within the period of 21 days, the Procuring Entity's Personnel may proceed with the Tests at the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

9.3 Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause7.5 [Rejection] shall

apply, and the Project Manager or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

9.4 Failure to Pass Tests on Completion

9.4.1 If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause9.3[Retesting], the Project Manager shall be entitled to:

a. Order further repetition of Tests on Completion under Sub-Clause9.3;

b. if the failure deprives the Procuring Entity of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Procuring Entity shall have the same remedies as are provided in sub-paragraph (c) of Sub-Clause11.4 [Failure to Remedy Defects]; or

c. issue a Taking-Over Certificate, if the Procuring Entity so requests.

9.4.2 In the event of sub-paragraph (c), the Contractor shall proceed in accordance with all other obligations under the Contract, and the Contract Price shall be reduced by such amount as shall be appropriate to cover the reduced value to the Procuring Entity as a result of this failure. Unless the relevant reduction for this failure is stated (or its method of calculation is defined) in the Contract, the Procuring Entity may require the reduction to be (i) agreed by both Parties (in full satisfaction of this failure only) and paid before this Taking-Over Certificate is issued, or (ii) determined and paid under Sub-Clause 2.5 [Procuring Entity's Claims] and Sub-Clause 3.5 [Determinations].

10 Procuring Entity's Taking Over

10.1 Taking Over of the Works and Sections

10.1.1 Except as stated in Sub-Clause9.4 [Failure to Pass Tests on Completion], the Works shall be taken over by the Procuring Entity when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause8.2 [Time for Completion] and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

10.1.2 The Contractor may apply by notice to the Project Manager for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.

10.1.3 The Project Manager shall, within 28 days after receiving the Contractor's application:

a. Issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or

b. reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

10.1.4 If the Project Manager fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 28 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.

10.2 Taking Over of Parts of the Works

10.2.1 The Project Manager may, at the sole discretion of the Procuring Entity, issue a Taking-Over Certificate for any part of the Permanent Works.

10.2.2 The Procuring Entity shall not use any part of the Works (other than as a temporary measure which is either specified in the Contract or agreed by both Parties) unless and until the Project Manager has issued a Taking- Over Certificate for this part. However, if the Procuring Entity does use any part of the Works before the Taking- Over Certificate is issued:

a) The part which is used shall be deemed to have been taken over as from the date on which it is used,

b) The Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Procuring Entity, and

c) If requested by the Contractor, the Project Manager shall issue a Taking-Over Certificate for this part.

10.2.3 After the Project Manager has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Notification Period.

10.2.4 If the Contractor incurs Cost as a result of the Procuring Entity taking over and/or using a part of the Works, other than such use as is specified in the Contractor agreed by the Contractor, the Contractor shall (i) give notice to the Project Manager and (ii) be entitled subject to Sub-Clause 20.1[Contractor's Claims] to payment of any such Cost-plus profit, which shall be included in the Contract Price. After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause3.5 [Determinations] to agree or determine this Cost and profit.

10.2.5 If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the delay damages thereafter for completion of the remainder of the Works shall be reduced. Similarly, the delay damages for the remainder of the Section (if any) in which this part is included shall also be reduced. For any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these delay damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these proportions. The provisions of this paragraph shall only apply to the daily rate of delay damages under Sub-Clause 8.7 [Delay Damages], and shall not affect the maximum amount of these damages.

10.3 Interference with Tests on Completion

10.3.1 If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Procuring Entity is responsible, the Procuring Entity shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

10.3.2 The Project Manager shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Project Manager shall require the Tests on Completion to be carried out by giving 14 days' notice and in accordance with the relevant provisions of the Contract.

10.3.3 If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Project Manager and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

a an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b payment of any such Cost-plus profit, which shall be included in the Contract Price.

10.3.4 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

10.4 Surfaces Requiring Reinstatement

Except as otherwise stated in a Taking-Over Certificate, a certificate for a Section or part of the Works shall not be deemed to certify completion of any ground or other surfaces requiring reinstatement.

11. Defects Liability

11.1.1 Completion of Outstanding Work and Remedying Defects

11.1.2 In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall:

a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Project Manager, and

b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Procuring Entity on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

11.1.3 If a defect appears or damage occurs, the Contractor shall be notified accordingly, by (or on behalf of) the Procuring Entity.

11.2 Cost of Remedying Defects

11.2.1 All work referred to in sub-paragraph (b) of Sub-Clause11.1 [Completion of Outstanding Work and Remedying Defects] shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

a) Any design for which the Contractor is responsible,

b) Plant, Materials or workmanship not being in accordance with the Contract, or

c) Failure by the Contractor to comply with any other obligation.

11.2.2 If and to the extent that such work is attributable to any other cause, the Contractor shall be notified promptly by (or on behalf of) the Procuring Entity, and Sub-Clause13.3 [Variation Procedure] shall apply.

11.3 Extension of Defects Notification Period

11.3.1 The Procuring Entity shall be entitled subject to Sub-Clause2.5 [Procuring Entity's Claims] to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or by reason of damage attributable to the Contractor. However, a Defects Notification Period shall not be extended by more than two years.

11.3.2 If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause8.8 [Suspension of Work] or Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work], the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.

11.4 Failure to Remedy Defects

11.4.1 If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Procuring Entity, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

11.4.2 If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause11.2 [Cost of Remedying Defects],

the Procuring Entity may (at his option):

a. carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 [Procuring Entity's Claims] pay to the Procuring Entity the costs reasonably incurred by the Procuring Entity in remedying the defect or damage;

b. require the Project Manager to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause3.5[Determinations]; or

c. if the defector damage deprives the Procuring Entity of substantially the whole benefit of the Works or any major part of the Works, terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contractor otherwise, the Procuring Entity shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

11.5 Removal of Defective Work

If the defect or damage cannot be remedied expeditiously on the Site and the Procuring Entity gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.

11.6 Further Tests

11.6.1 If the work of remedying of any defect or damage may affect the performance of the Works, the Project Manager may require the repetition of any of the tests described in the Contract. The requirement shall be made by notice within 28 days after the defect or damage is remedied.

11.6.2 These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause11.2 [Cost of Remedying Defects], for the cost of the remedial work.

11.7 Right of Access

Until the Performance Certificate has been issued, the Contractor shall have such right of access to the Works as is reasonably required in order to comply with this Clause, except as may be inconsistent with the Procuring Entity's reasonable security restrictions.

11.8 Contractor to Search

The Contractor shall, if required by the Project Manager, search for the cause of any defect, under the direction of the Project Manager. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause11.2 [Cost of Remedying Defects], the Cost of the search plus profit shall be agreed or determined by the Project Manager in accordance with Sub-Clause3.5 [Determinations] and shall be included in the Contract Price.

11.9 Performance Certificate

11.9.1 Performance of the Contractor's obligations shall not be considered to have been completed until the Project Manager has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

11.9.2 The Project Manager shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Procuring Entity.

11.9.3 Only the Performance Certificate shall be deemed to constitute acceptance of the Works.

11.10 Unfulfilled Obligations

After the Performance Certificate has been issued, each Party shall remain liable for the fulfilment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

11.11 Clearance of Site

11.11.1 Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

11.11.2 If all these items have not been removed within 28 days after receipt by the Contractor of the Performance Certificate, the Procuring Entity may sell or otherwise dispose of any remaining items. The Procuring Entity shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

11.11.3 Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Procuring Entity's costs, the Contractor shall pay the outstanding balance to the Procuring Entity.

12 Measurement and Evaluation

12.1 Works to be Measured

12.1.1 The Works shall be measured, and valued for payment, in accordance with this Clause. The Contractor shall show in each application under Sub-Clauses 14.3 [Application for Interim Payment Certificates], 14.10 [Statement on Completion] and 14.11 [Application for Final Payment Certificate] the quantities and other particulars detailing the amounts which he considers to be entitled under the Contract.

12.1.2 Whenever the Project Manager requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

a. Promptly either attend or send another qualified representative to assist the Project Manager in making the measurement, and

b. Supply any particulars requested by the Project Manager.

12.1.3 If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) the Project Manager shall be accepted as accurate.

12.1.4 Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured from records, these shall be prepared by the Project Manager. The Contractor shall, as and when requested, attend to examine and agree the records with the Project Manager, and shall sign the same when agreed. If the Contractor does not attend, the records shall be accepted as accurate.

12.1.5 If the Contractor examines and disagrees with the records, and/or does not sign them as agreed, then the Contractor shall give notice to the Project Manager of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Project Manager shall review the records and either confirm or vary them and certify the payment of the undisputed part. If the Contractor does not so give notice to the Project Manager within 14 days after being requested to examine the records, they shall be accepted as accurate.

12.2 Method of Measurement

Except as otherwise stated in the Contract and not withstanding local practice:

a) Measurement shall be made of the net actual quantity of each item of the Permanent Works, and

b) the method of measurement shall be in accordance with the Bill of Quantities or other

applicable Schedules.

12.3 Evaluation

12.3.1 Except as otherwise stated in the Contract, the Project Manager shall proceed in accordance with Sub-Clause
3.5 [Determinations] to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 and 12.2 and the appropriate rate or price for the item.

12.3.2 For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contractor, if there is no such item, specified for similar work.

12.3.3 Any item of work included in the Bill of Quantities for which no rate or price was specified shall be considered as included in other rates and prices in the Bill of Quantities and will not be paid for separately.

12.3.4 However, a new rate or price shall be appropriate for an item of work if:

a) i) the measured quantity of the item is changed by more than 25% from the quantity of this item in the Bill of Quantities or another Schedule,

ii) this change in quantity multiplied by such specified rate for this item exceeds 0.25% of the Accepted Contract Amount,

iii) this change in quantity directly changes the Cost per unit quantity of this item by more than 1%, and

iv) this item is not specified in the Contract as a "fixed

rate item"; or

b) the work is instructed under Clause13 [Variations and Adjustments],

ii) no rate or price is specified in the Contract for this item, and

iii) no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract.

b) Each new rate or price shall be derived from any relevant rates or prices in the Contract, with reasonable adjustments to take account of the matters described in sub-paragraph (a) and/or (b), as applicable. If no rates or prices are relevant for the derivation of a new rate or price, it shall be derived from the reasonable Cost of executing the work, together with profit, taking account of any other relevant matters.

c) Until such time as an appropriate rate or price is agreed or determined, the Project Manager shall determine a provisional rate or price for the purposes of Interim Payment Certificates as soon as the concerned work commences.

12.4 Omissions

d) Whenever the omission of any work forms part (or all) of a Variation, the value of which has not been agreed, if:

i) The Contractor will incur (or has incurred) cost which, if the work had not been omitted, would have been deemed to be covered by a sum forming part of the Accepted Contract Amount;

ii) The omission of the work will result (or has resulted) in this sum not forming part of the Contract Price; and

iii) This cost is not deemed to be included in the evaluation of any substituted work;

12.4.1 then the Contractor shall give notice to the Project Manager accordingly, with supporting particulars. Upon receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause3.5 [Determinations] to agree or determine this cost, which shall be included in the Contract Price.

13 Variations and Adjustments

13.1 Right to Vary

13.1.1 Variations may be initiated by the Project Manager at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal.

13.1.2 The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Project Manager stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, or (ii) such Variation triggers a substantial change in the sequence or progress of the Works. Upon receiving this notice, the Project Manager shall cancel, confirm or vary the instruction.

13.1.3 Each Variation may include:

a. changes to the quantities of any item of work included in the Contract (however, such changes do not necessarily constitute a Variation),

b. changes to the quality and other characteristics of any item of work,

c. changes to the levels, positions and/or dimensions of any part of the Works,

d. omission of any work unless it is to be carried out by others,

e. any additional work, Plant, Materials or services necessary for the Permanent Works, including any associated Tests on Completion, bore holes and other testing and exploratory work, or

f. changes to the sequence or timing of the execution of the Works.

13.1.4 The Contractor shall not make any alteration and/or modification of the Permanent Works, unless and until the Project Manager instructs or approves a Variation.

13.2 Value Project Engineering

13.2.1 The Contractor may, at any time, submit to the Project Manager a written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Procuring Entity of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Procuring Entity of the completed Works, or (iv) otherwise be of benefit to the Procuring Entity.

13.2.2 The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause13.3 [Variation Procedure].

13.2.3 If a proposal, which is approved by the Project Manager, includes a change in the design of part of the Permanent Works, then unless otherwise agreed by both Parties:

a. The Contractor shall design this part,

b. sub-paragraphs (a)to (d) of Sub-Clause4.1[Contractor's General Obligations] shall apply, and

c. if this change results in a reduction in the contract value of this part, the Project Manager shall proceed in accordance with Sub-Clause3.5 [Determinations] to agree or determine a fee, which shall be included in the Contract Price. This fee shall be half (50%) of the difference between the following amounts:

    a. such reduction in contract value, resulting from the change, excluding adjustments under Sub- Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost], and

    b. the reduction (if any) in the value to the Procuring Entity of the varied works, taking account of any reductions in quality, anticipated life or operational efficiencies.

13.2.4 However, if amount (i) is less than amount (ii), there shall not be a fee.

13.3 Variation Procedure

13.3.1 If the Project Manager requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

a. A description of the proposed work to be performed and a programme for its execution,
b. The Contractor's proposal for any necessary modifications to the programme according to Sub-Clause8.3 [Programme] and to the Time for Completion, and
c. The Contractor's proposal for evaluation of the Variation.

13.3.2 The Project Manager shall, as soon as practicable after receiving such proposal (under Sub-Clause13.2 [Value Project Managering] or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

13.3.3 Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Project Manager to the Contractor, who shall acknowledge receipt.

13.3.4 Each Variation shall be evaluated in accordance with Clause 12 [Measurement and Evaluation], unless the Project Manager instructs or approves otherwise in accordance with this Clause.

13.4 Payment in Applicable Currencies

If the Contract provides for payment of the Contract Price in more than one currency, then whenever an adjustment is agreed, approved or determined as stated above, the amount payable in each of the applicable

currencies shall be specified. For this purpose, reference shall be made to the actual or expected currency proportions of the Cost of the varied work, and to the proportions of various currencies specified for payment of the Contract Price.

13.5 Provisional Sums

13.5.1 Each Provisional Sum shall only be used, in whole or in part, in accordance with the Project Manager's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Project Manager shall have instructed. For each Provisional Sum, the Project Manager may instruct:

a. Work to be executed (including Plant, Materials or services to be supplied) by the Contractor and valued under Sub-Clause13.3[Variation Procedure]; and/or

b. Plant, Materials or services to be purchased by the Contractor, from a nominated Subcontractor (as defined in Clause5 [Nominated Subcontractors]) or otherwise; and for which there shall be included in the Contract Price:

i. The actual amounts paid (or due to be paid) by the Contractor, and

ii. a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule. If there is no such rate, the percentage rate stated in **the Particular Conditions of Contract** shall be applied.

13.5.2 The Contractor shall, when required by the Project Manager, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

13.6 Day works

13.6.1 For work of a minor or incidental nature, the Project Manager may instruct that a Variation shall be executed on a day work basis. The work shall then be valued in accordance with the Day work Schedule included in the Contract, and the following procedure shall apply. If a Day work Schedule

is not included in the Contract, this Sub-Clause shall not apply.

13.6.2 Before ordering Goods for the work, the Contractor shall submit quotations to the Project Manager. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Goods.

13.6.3 Except for any items for which the Day work Schedule specifies that payment is not due, the Contractor shall deliver each day to the Project Manager accurate statements in duplicate which shall include the following details of the resources used in executing the previous day's work:

a. The names, occupations and time of Contractor's Personnel,

b. The identification, type and time of Contractor's Equipment and Temporary Works, and

c. The quantities and types of Plant and Materials used.

13.6.4 One copy of each statement will, if correct, or when agreed, be signed by the Project Manager and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the Project Manager, prior to their inclusion in the next Statement under Sub-Clause 14.3 [Application for Interim Payment Certificates].

13.7 Adjustments for Changes in Legislation

13.7.1 The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of Kenya (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date, which affect the Contractor in the performance of obligations under the Contract.

13.7.2 If the Contractor suffers (or will suffer) delay and/or incurs (or will incur) additional Cost as a result of these changes in the Laws or in such interpretations, made after the Base Date, the Contractor shall give notice to the Project Manager and shall be entitled subject to Sub-Clause20.1[Contractor's Claims] to:

a. an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b. payment of any such Cost, which shall be included in the Contract Price.

13.7.3 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

13.7.4 Notwithstanding the fore going, the Contractor shall not be entitled to an extension of time if the relevant delay has already been considered in the determination of a previous extension of time and such Cost shall not be separately paid if the same shall already have been considered in the indexing of any inputs to the table of adjustment data in accordance with the provisions of Sub-Clause13.8 [Adjustments for Changes in Cost].

13.8 Adjustments for Changes in Cost

13.8.1 In this Sub-Clause, “table of adjustment data” means the completed table of adjustment data for local and foreign currencies included in the Schedules. If there is no such table of adjustment data, this Sub-Clause shall not apply.

13.8.2 If this Sub-Clause applies, the amounts payable to the Contractor shall be adjusted for rises or falls in the cost of labor, Goods and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in this Sub-Clause. To the extent that full compensation for any rise or fall in Costs is not covered by the provisions of this or other Clauses, the Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of other rises and falls in costs.

13.8.3 The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate Schedule and certified in Payment Certificates, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be of the following general type:

Price Adjustment

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, before 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 specified below applies:

P = A + B Im/Io

where: P

is the adjustment factor for the portion of the Contract Price payable.

A and B are coefficients **specified in the SCC,** representing the non-adjustable and adjustable portions, respectively, of the Contract Price payable and Im is the index prevailing at the end of the month being invoiced and Ioc is the index prevailing 28 days before Tender opening for inputs payable.

NOTE: The sum of the two coefficients A and B should be1(one) in the formula for each currency. Normally, both coefficients shall be the same in the formulae for all currencies, since coefficient A, for the non-adjustable portion of the payments, is a very approximate figure (usually 0.15) to take account of fixed cost elements or other non-adjustable components. The sum of the adjustments for each currency are added to the Contract Price.

13.8.4 The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, it shall be determined by the Project Manager. For this purpose, reference shall be made to the values of the indices at stated dates (quoted in the fourth and fifth columns respectively of the table) for the purposes of clarification of the source; although these dates (and thus these values) may not correspond to the base cost indices.

13.8.5 In cases where the "currency of index" is not the relevant currency of payment, each index shall be converted into the relevant currency of payment at the selling rate, established by the Central Bank of Kenya, of this relevant currency on the above date for which the index is required to be applicable.

13.8.6 Until such time as each current cost index is available, the Project Manager shall determine a provisional index for the issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.

13.8.7 If the Contractor fails to complete the Works within the Time for Completion, adjustment of prices thereafter shall be made using either (i) each index or price applicable on the date 49 days prior to the expiry of the Time for Completion of the Works, or (ii) the current index or price, whichever is more favorable to the Procuring Entity.

13.8.8 The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or in applicable, as a result of Variations.

14 Contract Price and Payment

14.1 The Contract Price

14.1.1 Unless otherwise stated in the Particular Conditions:

a. the Contract Price shall be agreed or determined under Sub-Clause 12.3 [Evaluation] and be

subject to adjustments in accordance with the Contract;

b. the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs except as stated in Sub-Clause 13.7 [Adjustments for Changes in Legislation];

c. any quantities which may be set out in the Bill of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities:

   i. of the Works which the Contractor is required to execute, or

   ii. for the purposes of Clause12 [Measurement and Evaluation]; and

d. the Contractor shall submit to the Project Manager, within 28 days after the Commencement Date, a proposed breakdown of each lump sum price in the Schedules. The Project Manager may take account of the breakdown when preparing Payment Certificates, but shall not be bound by it.

14.1.2 Notwithstanding the provisions of subparagraph (b), Contractor's Equipment, including essential spare parts there for, imported by the Contractor for the sole purpose of executing the Contract shall be exempt from the payment of import duties and taxes upon importation.

14.2 Advance Payment

14.2.1 The Procuring Entity may make an advance payment, as an interest-free loan for mobilization and cash flow support, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment, the number and timing of instalments (if more than one), and the applicable currencies and proportions, shall be as stated in the **Particular Conditions of Contract.**

14.2.2 Unless and until the Procuring Entity receives this guarantee, or if the total advance payment is not stated in the Particular Conditions of Contract, this Sub-Clause shall not apply.

14.2.3 The Project Manager shall deliver to the Procuring Entity and to the Contractor an Interim Payment Certificate for the advance payment or its first instalment after receiving a Statement (under Sub-Clause14.3 [Application for Interim Payment Certificates]) and after the Procuring Entity receives (i) the Performance Security in accordance with Sub-Clause4.2 [Performance Security] and (ii) a guarantee in amounts and currencies equal to the advance payment. This guarantee shall be issued by a reputable bank or financial institution selected by the Contractor and shall be in the form annexed to the Particular Conditions or in another form approved by the Procuring Entity.

14.2.4 The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount shall be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

14.2.5 Unless stated otherwise in the **Particular Conditions of Contract**, the advance payment shall be repaid through percentage deductions from the interim payments determined by the Project Manager in accordance with Sub-Clause14.6 [Issue of Interim Payment Certificates], as follows:

a. Deductions shall commence in the next interim Payment Certificate following that in which the total of all certified interim payments (excluding the advance payment and deductions and repayments of retention) exceeds 30 percent (30%) of the Accepted Contract Amount Less Provisional Sums; and

b. Deductions shall be made at the amortization rate stated in the **Particular Conditions of Contract** of the amount of each Interim Payment Certificate (excluding the advance payment and deductions for its repayments as well as deductions for retention money) in the currencies and proportions of the advance payment until such time as the advance payment has been repaid; provided that the advance payment shall be completely repaid prior to the time when 90 percent (90%) of the Accepted Contract Amount Less Provisional Sums has

been certified for payment.

14.2.6 If the advance payment has not been repaid prior to the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15 [Termination by Procuring Entity], Clause 16 [Suspension and Termination by Contractor] or Clause19 [Force Majeure] (as the case may be), the whole of the balance then outstanding shall immediately become due and in case of termination under Clause 15 [Termination by Procuring Entity], except for Sub-Clause 15.5 [Procuring Entity's Entitlement to Termination for Convenience], payable by the Contractor to the Procuring Entity.

14.3 Application for Interim Payment Certificates

14.3.1 The Contractor shall submit a Statement in six copies to the Project Manager after the end of each month, in a form approved by the Project Manager, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month in accordance with Sub-Clause 4.21 [Progress Reports].

14.3.2 The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

a. the estimated contract value of the Works executed and the Contractor's Documents produced up to the endofthemonth(includingVariationsbutexcludingitemsdescribedinsub-paragraphs(b)to(g)below);

b. any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause 13.8 [Adjustments for Changes in Cost];

c. any amount to be deducted for retention, calculated by applying the percentage of retention stated in **the Particular Conditions of Contract** to the total of the above amounts, until the amount so retained by the Procuring Entity reaches the limit of Retention Money (if any) stated in **the Particular Conditions of Contract**;

d. any amounts to be added for the advance payment and (if more than one instalment) and to be deducted for its repayments in accordance with Sub-Clause14.2 [Advance Payment];

e. any amounts to be added and deducted for Plant and Materials in accordance with Sub-Clause14.5 [Plant and Materials intended for the Works];

f. any other additions or deductions which may have become due under the Contract or otherwise, including those under Clause 20 [Claims, Disputes and Arbitration]; and

g. the deduction of amounts certified in all previous Payment Certificates.

14.4 Schedule of Payments

14.4.1 The Contract includes a schedule of payments specifying the instalments in which the Contract Price will be paid, unless otherwise stated in this schedule:

a. The instalments quoted in this schedule of payments shall be the estimated contract values for the purposes of sub-paragraph (a) of Sub-Clause14.3 [Application for Interim Payment Certificates];

b. Sub-Clause14.5 [Plant and Materials intended for the Works] shall not apply; and

c. If these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less or more than that on which this schedule of payments was based, then the Project Manager may proceed in accordance with Sub-Clause3.5 [Determinations] to agree or determine revised instalments, which shall take account of the extent to which progress is less or more than that on which the instalments were previously based.

14.4.2 The Contract include a schedule of payments, attached to this contract as Document_____

14.4.3 The Contractor shall submit non-binding estimates of the payments which he expects to become due during each quarterly period. The first estimate shall be submitted within 42 days after the

Commencement Date. Revised estimates shall be submitted at quarterly intervals, until the Taking-Over Certificate has been issued for the Works.

14.5 Plant and Materials intended for the Works

14.5.1 If this Sub-Clause applies, Interim Payment Certificates shall include, under sub-paragraph (e) of Sub-Clause 14.3, (i) an amount for Plant and Materials which have been sent to the Site for incorporation in the Permanent Works, and (ii) a reduction when the contract value of such Plant and Materials is included as part of the Permanent Works under sub-paragraph (a) of Sub-Clause14.3 [Application for Interim Payment Certificates].

14.5.2 If the lists referred to in sub-paragraphs (b) (i) or (c) (i) below are not included in the Schedules, this Sub-Clause shall not apply.

14.5.3 The Project Manager shall determine and certify each addition if the following conditions are satisfied:

a. The Contractor has:

(i) Kept satisfactory records (including the orders, receipts, Costs and use of Plant and Materials) which are available for inspection, and

(ii) submitted a statement of the Cost of acquiring and delivering the Plant and Materials to the Site, supported by satisfactory evidence;

and either:

b. the relevant Plant and Materials:

(i) are those listed in the Schedules for payment when shipped,

(ii) have been shipped to Kenya, enroute to the Site, in accordance with the Contract; and

(iii) are described in a clean shipped bill of lading or other evidence of shipment, which has been submitted to the Project Manager together with evidence of payment of freight and insurance, any other documents reasonably required, and a bank guarantee in a form and issued by an entity approved by the Procuring Entity in amounts and currencies equal to the amount due under this Sub- Clause: this guarantee may be in a similar form to the form referred to in Sub-Clause14.2 [Advance Payment] and shall be valid until the Plant and Materials are properly stored on Site and protected against loss, damage or deterioration; or

c. the relevant Plant and Materials:

(i) are those listed in the Schedules for payment when delivered to the Site, and

(ii) have been delivered to and are properly stored on the Site, are protected against loss, damage or deterioration, and appear to be in accordance with the Contract.

14.5.4 The additional amount to be certified shall be the equivalent of eighty percent (80%) of the Project Manager's determination of the cost of the Plant and Materials (including delivery to Site), taking account of the documents mentioned in this Sub-Clause and of the contract value of the Plant and Materials.

14.5.6 The currencies for this additional amount shall be the same as those in which payment will become due when the contract value is included under sub-paragraph (a) of Sub-Clause 14.3 [Application for Interim Payment Certificates]. At that time, the Payment Certificate shall include the applicable reduction which shall be equivalent to, and in the same currencies and proportions as, this additional amount for the relevant Plant and Materials.

14.6 Issue of Interim Payment Certificates

14.6.1 No amount will be certified or paid until the Procuring Entity has received and approved the Performance Security. Thereafter, the Project Manager shall, within 28 days after receiving a

Statement and supporting documents, deliver to the Procuring Entity and to the Contractor an Interim Payment Certificate which shall state the amount which the Project Manager fairly determines to be due, with all supporting particulars for any reduction or with holding made by the Project Manager on the Statement if any.

14.6.2 However, prior to issuing the Taking-Over Certificate for the Works, the Project Manager shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of Interim Payment Certificates (if any) stated **in the Particular Conditions of Contract**. In this event, the Project Manager shall give notice to the Contractor accordingly.

14.6.3 An Interim Payment Certificate shall not be withheld for any other reason, although:

a) if anything supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or

b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and had been so notified by the Project Manager, the value of this work or obligation may be withheld until the work or obligation has been performed.

14.6.4 The Project Manager may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A Payment Certificate shall not be deemed to indicate the Project Manager's acceptance, approval, consent or satisfaction.

14.7 Payment

14.7.1 The Procuring Entity shall pay to the Contractor:

a) The first instalment of the advance payment within 42 days after issuing the Letter of Acceptance or within 21 days after receiving the documents in accordance with Sub-Clause 4.2 [Performance Security] and Sub-Clause14.2 [Advance Payment], whichever is later;

b) the amount certified in each Interim Payment Certificate within 45 days after the Project Manager receives the Statement and supporting documents; and

c) the amount certified in the Final Payment Certificate within 45 days after the Procuring Entity receives this Payment Certificate; or after determination of any disputed amount shown in the Final Statement in accordance with Sub-Clause16.2 [Termination by Contractor].

14.7.2 Payment of the amount due in each currency shall be made into the bank account, nominated by the Contractor, in the payment country (for this currency) specified in the Contract.

14.8 Delayed Payment

14.8.1 If the Contractor does not receive payment in accordance with Sub-Clause14.7 [Payment], the Contractor shall be entitled to receive financing charges (interest) compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the date for payment specified in Sub-Clause 14.7 [Payment], irrespective (in the case of its sub-paragraph (b) of the date on which any Interim Payment Certificate is issued.

14.8.2 Unless otherwise stated in **the Particular Conditions**, these financing charges shall be calculated at the annual rate of three percentage points above the discount rate of the central bank in Kenya of the currency of payment, or if not available, the interbank offered rate, and shall be paid in such currency.

14.8.3 The Contractor shall be entitled to this payment without formal notice or certification, and without prejudice 14.9 to any other right or remedy.

14.9 Payment of Retention Money

14.9.2 When the Taking-Over Certificate has been issued for the Works, the first half of the Retention Money shall be certified by the Project Manager for payment to the Contractor. If a Taking-Over Certificate is issued for a Section or part of the Works, a proportion of the Retention Money shall be certified and paid. This proportion shall behalf (50%) of the proportion calculated by dividing the estimated contract value of the Section or part, by the estimated final Contract Price.

14.9.3 Promptly after the latest of the expiry dates of the Defects Notification Periods, the outstanding balance of the Retention Money shall be certified by the Project Manager for payment to the Contractor. If a Taking-Over Certificate was issued for a Section, a proportion of the second half of the Retention Money shall be certified and paid promptly after the expiry date of the Defects Notification Period for the Section. This proportion shall behalf (50%) of the proportion calculated by dividing the estimated contract value of the Section by the estimated final Contract Price.

14.9.4 However, if any work remains to be executed under Clause11 [Defects Liability], the Project Manager shall be entitled to withhold certification of the estimated cost of this work until it has been executed.

14.9.5 When calculating these proportions, no account shall be taken of any adjustments under Sub-Clause 13.7 [Adjustments for Changes in Legislation] and Sub-Clause13.8 [Adjustments for Changes in Cost].

14.9.6 Unless otherwise stated in the Particular Conditions, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment by the Project Manager, the Contractor shall be entitled to substitute a Retention Money Security guarantee, in the form annexed to the particular Conditions or in another form approved by the Procuring Entity and issued by a reputable bank or financial institution selected by the Contractor, for the second half of the Retention Money.

14.9.5 The Procuring Entity shall return the Retention Money Security guarantee to the Contractor within 14 days after receiving a copy of the Performance Certificate.

14.10 Statement at Completion

14.10.1 Within 84 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Project Manager six copies of a Statement at completion with supporting documents, in accordance with Sub- Clause14.3 [Application for Interim Payment Certificates], showing:

a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,

b) any further sums which the Contractor considers to be due, and

c) an estimate of any other amounts which the Contractor considers will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

14.10.2 The Project Manager shall then certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates].

14.10 Application for Final Payment Certificate

14.10.1 Within 56 days after receiving the Performance Certificate, the Contractor shall submit, to the Project Manager, six copies of a draft final statement with supporting documents showing in detail in a form approved by the Project Manager:

a. The value of all work done in accordance with the Contract, and

b. Any further sums which the Contractor considers to be due to him under the Contractor otherwise.

14.10.2If the Project Manager disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Project Manager may reasonably require

within 28days from receipt of said draft and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Project Manager the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".

14.10.3However, if, following discussions between the Project Manager and the Contractor and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, the Project Manager shall deliver to the Procuring Entity (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved under Sub-Clause20.4[Obtaining Dispute Board's Decision] or Sub-Clause20.5[Amicable Settlement], the Contractor shall then prepare and submit to the Procuring Entity (with a copy to the Project Manager) a Final Statement.

14.11 Discharge

When submitting the Final Statement, the Contractor shall submit a discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the outstanding balance of this total, in which event the discharge shall be effective on such date.

14.12 Issue of Final Payment Certificate

14.12.1Within 28 days after receiving the Final Statement and discharge in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Project Manager shall deliver, to the Procuring Entity and to the Contractor, the Final Payment Certificate which shall state:

a. The amount which he fairly determines is finally due, and

b. aftergivingcredittotheProcuringEntityforallamountspreviouslypaidbytheProcuringEntityandfor all sums to which the Procuring Entity is entitled, the balance (if any) due from the Procuring Entity to the Contractor or from the Contractor to the Procuring Entity, as the case may be.

14.12.2If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.11 [Application for Final Payment Certificate] and Sub-Clause 14.12 [Discharge], the Project Manager shall request the Contractor to do so. If the Contractor fails to apply within a period of 28 days, the Project Manager shall issue the Final Payment Certificate for such amount a she fairly determines to be due.

14.13 Cessation of Procuring Entity's Liability

14.13.1 The Procuring Entity shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

a) In the Final Statement and also

b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause14.10 [Statement at Completion].

14.13.2 However, this Sub-Clause shall not limit the Procuring Entity's liability under his indemnification obligations, or the Procuring Entity's liability in any case of fraud, deliberate default or reckless misconduct by the Procuring Entity.

14.14 Currencies of Payment

14.14.1 The Contract Price shall be paid in the currency or currencies named in the Schedule of Payment Currencies. If more than one currency is so named, payments shall be made as follows:

a) If the Accepted Contract Amount was expressed in Local Currency only:

i) The proportions or amounts of the Local and Foreign Currencies, and the fixed rates of exchange to be used for calculating the payments, shall be as stated in the Schedule of Payment Currencies, except as otherwise agreed by both Parties;

ii) payments and deductions under Sub-Clause 13.5 [Provisional Sums] and Sub-Clause 13.7 [Adjustments for Changes in Legislation] shall be made in the applicable currencies and proportions; and

iii) other payments and deductions under sub-paragraphs (a) to (d) of Sub-Clause14.3[Application for Interim Payment Certificates] shall be made in the currencies and proportions specified in sub- paragraph (a) (i) above;

b) payment of the damages specified in the Particular Conditions of Contract, shall be made in the currencies and proportions specified in the Schedule of Payment Currencies;

c) other payments to the Procuring Entity by the Contractor shall be made in the currency in which the sum was expended by the Procuring Entity, or in such currency as may be agreed by both Parties;

d) if any amount payable by the Contractor to the Procuring Entity in a particular currency exceeds the sum payable by the Procuring Entity to the Contractor in that currency, the Procuring Entity may recover the balance of this amount from the sums otherwise payable to the Contractor in other currencies; and

e) if no rates of exchange are stated in the Schedule of Payment Currencies, they shall be those prevailing on the Base Date and determined by the central bank of Kenya.

14.13.1Termination by Procuring Entity

14.14.1 Notice to Correct

If the Contractor fails to carry out any obligation under the Contract, the Project Manager may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

14.15Termination by Procuring Entity

14.15.1The Procuring Entity shall be entitled to terminate the Contract if the Contractor:

a. fails to comply with Sub-Clause 4.2 [Performance Security] or with a notice under Sub-Clause 15.1 [Notice to Correct],

b. abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,

c. without reasonable excuse fails:

i. to proceed with the Works in accordance with Clause8 [Commencement, Delays and Suspension], or

ii. to comply with a notice issued under Sub-Clause 7.5 [Rejection] or Sub-Clause 7.6 [Remedial Work], within 28days after receiving it,

d. subcontracts the major part or whole of the Works or assigns the Contract without the agreement with Procuring Entity,

e. becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events, or

f. gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward:

i. for doing or for bearing to do any action in relation to the Contract, or

ii. for showing or for bearing to show favor or disfavor to any person in relation to the Contract, or

iii. if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph (f).

g. However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination, or based on reasonable evidence, has engaged in Fraud and Corruption as defined in paragraph 2.2 of the Appendix B to these General Conditions, in competing for or in executing the Contract.

14.15.2In any of these events or circumstances, the Procuring Entity may, upon giving 14 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub- paragraph (e) or (f) or (g), the Procuring Entity may by notice terminate the Contract immediately.

14.15.3The Procuring Entity's election to terminate the Contract shall not prejudice any other rights of the Procuring Entity, under the Contract or otherwise.

14.15.4The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Project Manager. However, the Contractor shall use his Lowest efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

14.15.5After termination, the Procuring Entity may complete the Works and/ or arrange for any other entities to do so. The Procuring Entity and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

14.15.6The Procuring Entity shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Procuring Entity, these items may be sold by the Procuring Entity in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

14.16 Valuation at Date of Termination

As soon as practicable after a notice of termination under Sub-Clause15.2 [Termination by Procuring Entity] has taken effect, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

14.17 Payment after Termination

After a notice of termination under Sub-Clause 15.2 [Termination by Procuring Entity] has taken effect, the Procuring Entity may:

a) Proceed in accordance with Sub-Clause2.5[Procuring Entity's Claims],

b) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay incompletion (if any), and all other costs incurred by the Procuring Entity, have been established, and/or

c) recover from the Contractor any losses and damages incurred by the Procuring Entity and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3 [Valuation at Date of Termination]. After recovering any such losses, damages and extra costs, the Procuring Entity shall pay any balance to the Contractor.

14.18 Procuring Entity's Entitlement to Termination for Convenience

The Procuring Entity shall be entitled to terminate the Contract, at any time for the Procuring Entity's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 28days after the later of the dates on which the Contractor receives this notice or the Procuring Entity returns the Performance Security. The Procuring Entity shall not terminate the Contract under this Sub-Clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor or to avoid a termination of the Contract by the Contractor under Clause16.2 [Termination by Contractor].

After this termination, the Contractor shall proceed in accordance with Sub-Clause16.3 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause16.4[Payment on Termination].

14.19 Fraud and Corruption

The Procuring Entity requires compliance with the Kenya Government's Anti-Corruption Laws and its prevailing sanctions.

14.20 Corrupt gifts and payments of commission

14.20.1The Contractor shall not;

a. Offer or give or agree to give to any person in the service of the Procuring Entity any gift or consideration of any kind as an inducement or reward for doing or for bearing to do or for having done or for borne to do any act in relation to the obtaining or execution of this or any other Contract for the Procuring Entity or for showing or for bearing to show favour or disfavour to any person in relation to this or any other contract for the Procuring Entity.

b. Enter in to this or any other contract with the Procuring Entity in connection with which commission has been paid or agreed to be paid by him or on his behalf or to his knowledge, unless before the Contract is made particulars of any such commission and of the terms and conditions of any agreement for the payment there of have been disclosed in writing to the Procuring Entity.

15.7.1 Any breach of this Condition by the Contractor or by any one employed by him or acting on his behalf (whether with or without the knowledge of the Contractor) shall be an offence under the provisions of the Public Procurement Regulations issued under The Exchequer and Audit Act Cap412of the Laws of Kenya.

15 Suspension and Termination by Contractor

15.15Contractor's Entitlement to Suspend Work

15.15.1If the Project Manager fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or the Procuring Entity fails to comply with Sub-Clause 2.4 [Procuring Entity's Financial Arrangements] or Sub-Clause14.7[Payment], the Contractor may, after giving not less than 21days' notice to the Procuring Entity, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice.

15.15.2The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.8 [Delayed Payment] and to termination under Sub-Clause16.2 [Termination by Contractor].

15.15.3If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

15.15.4If the Contractor suffers delay and/ or incurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Project Manager

and shall be entitled subject to Sub-Clause20.1[Contractor's Claims] to:

a. an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

b. payment of any such Cost-plus profit, which shall be included in the Contract Price.

15.15.5After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

15.16 Termination by Contractor

15.16.1The Contractor shall be entitled to terminate the Contract if:

a. the Contractor does not receive the reasonable evidence within 45 days after giving notice under Sub- Clause16.1 [Contractor's Entitlement to Suspend Work] in respect of a failure to comply with Sub-Clause
b. 2.4 [Procuring Entity's Financial Arrangements],

c. the Project Manager fails, within 45days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,

d. the Contractor does not receive the amount due under an Interim Payment Certificate within 45days after the expiry of the time stated in Sub-Clause14.7[Payment] within which payment is to be made (except for deductions in accordance with Sub-Clause2.5 [Procuring Entity's Claims]),

e. the Procuring Entity substantially fails to perform his obligations under the Contract in such manner as to materially and adversely affect the economic balance of the Contract and/ or the ability of the Contractor to perform the Contract,

f. the Procuring Entity fails to comply with Sub-Clause 1.6 [Contract Agreement] or Sub-Clause 1.7 [Assignment],

g. a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 [Prolonged Suspension], or

h. the Procuring Entity becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.

i. The Contractor does not receive the Project Manager's instruction recording the agreement of both Parties on the fulfilment of the conditions for the Commencement of Works under Sub-Clause 8.1 [Commencement of Works.

15.16.2In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Procuring Entity, terminate the Contract. However, in the case of sub-paragraph (f) or (g), the Contractor may by notice terminate the Contract immediately.

15.16.3The Contractor' selection to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contractor otherwise.

15.17 Cessation of Work and Removal of Contractor's Equipment

After a notice of termination under Sub-Clause 15.5 [Procuring Entity's Entitlement to Termination for Convenience], Sub-Clause 16.2 [Termination by Contractor] or Sub-Clause 19.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly:

a) Cease all further work, except for such work as may have been instructed by the Project Manager for the protection of life or property or for the safety of the Works,

b) hand over Contractor's Documents, Plant, Materials and other work, for which the

Contractor has received payment, and

c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

15.18 Payment on Termination

After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the Procuring Entity shall promptly:

a) Return the Performance Security to the Contractor,

b) pay the Contractor in accordance with Sub-Clause 19.6 [Optional Termination, Payment and Release], and

c) pay to the Contractor the amount of any loss or damage sustained by the Contractor as a result of this termination.

17. Risk and Responsibility

17.1 Indemnities

17.1.1 The Contractor shall indemnify and hold harmless the Procuring Entity, the Procuring Entity's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

a. Bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, willful act or breach of the Contract by the Procuring Entity, the Procuring Entity's Personnel, or any of their respective agents, and

b. Damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, willful act or breach of the Contract by the Procuring Entity, the Procuring Entity's Personnel, their respective agents, or any one directly or indirectly employed by any of them.

17.1.2 The Procuring Entity shall indemnify and hold harmless the Contractor, the Contractor's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness, disease or death, which is attributable to any negligence, willful act or breach of the Contract by the Procuring Entity, the Procuring Entity's Personnel, or any of their respective agents, and (2) the matters for which liability may be excluded from insurance cover, as described in sub-paragraphs (d) (i), (ii) and (iii) of Sub-Clause 18.3 [Insurance Against Injury to Persons and Damage to Property].

17.2 Contractor's Care of the Works

17.2.1 The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (orisdeemedtobeissuedunderSub-Clause10.1[Taking Over of the Works and Sections]) for the Works, when responsibility for the care of the Works shall pass to the Procuring Entity. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Procuring Entity.

17.2.2 After responsibility has accordingly passed to the Procuring Entity, the Contractor shall take responsibility for the care of any work which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

17.2.3 If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 [Procuring Entity's Risks], the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.

17.2.4 The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

17.3 Procuring Entity's Risks

The risks referred to in Sub-Clause 17.4 [Consequences of Procuring Entity's Risks] below, insofar as they directly affect the execution of the Works in Kenya, are:

a) War hostilities (whether war be declared or not),

b) rebellion, riot, commotion or disorder, terrorism, sabotage by persons other than the Contractor's Personnel,

c) explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such explosives, radiation or radio-activity,

d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,

e) use or occupation by the Procuring Entity of any part of the Permanent Works, except as may be specified in the Contract,

f) design of any part of the Works by the Procuring Entity's Personnel or by others for whom the Procuring Entity is responsible, and

g) any operation of the forces of nature which is Unforeseeable or against which an experienced contractor could not reasonably have been expected to have taken adequate preventive precautions.

17.4 Consequences of Procuring Entity's Risks

17.4.1 If and to the extent that any of the risks listed in Sub-Clause17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Project Manager and shall rectify this loss or damage to the extent required by the Project Manager.

17.4.2 If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Project Manager and shall be entitled subject to Sub-Clause20.1[Contractor's Claims] to:

(a) An extension of time for any such delay, if completion is or will be delayed, under Sub-Clause8.4 [Extension of Time for Completion], and

(b) Payment of any such Cost, which shall be included in the Contract Price. In the case of sub-paragraphs(f) and (g) of Sub-Clause 17.3 [Procuring Entity's Risks], Cost plus profit shall be payable.

17.4.3 After receiving this further notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

17.5 Intellectual and Industrial Property Rights

17.5.1 In this Sub-Clause, “infringement” means an infringement (or alleged infringement) of any patent, registered design, copyright, trademark, tradename, trade secret or other intellectual or industrial property right relating to the Works; and “claim” means a claim (or proceedings pursuing a claim) alleging an infringement.

17.5.2 Whenever a Party does not give notice to the other Party of any claim within 28days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

17.5.3 The Procuring Entity shall indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

a) An unavoidable result of the Contractor's compliance with the Contract, or

b) A result of any Works being used by the Procuring Entity:

i) For a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or

ii) in conjunction with anything not supplied by the Contractor, unless such use was disclosed to the Contractor prior to the Base Date or is stated in the Contract.

17.5.4 The Contractor shall indemnify and hold the Procuring Entity harmless against and from any other claim which arises out of or in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible.

17.5.5 If a Party is entitled to be indemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party.

17.6 Limitation of Liability

17.6.1 Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contractor for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than as specifically provided in Sub-Clause8.7 [Delay Damages]; Sub-Clause11.2[Cost of Remedying Defects]; Sub-Clause 15.4 [Payment after Termination]; Sub-Clause 16.4 [Payment on Termination]; Sub-Clause 17.1 [Indemnities]; Sub-Clause 17.4(b) [Consequences of Procuring Entity's Risks] and Sub-Clause17.5 [Intellectual and Industrial Property Rights].

17.6.2 The total liability of the Contractor to the Procuring Entity, under or in connection with the Contract other than under Sub-Clause4.19[Electricity, Water and Gas], Sub-Clause4.20 [Procuring Entity's Equipment and Free- Issue Materials], Sub-Clause 17.1 [Indemnities] and Sub-Clause 17.5 [Intellectual and Industrial Property Rights], shall not exceed the sum resulting from the application of a multiplier (less or greater than one) to the Accepted Contract Amount, as stated in the **Particular Conditions of Contract**, or (if such multiplier or other sum is not so stated) the Accepted Contract Amount.

17.6.3 This Sub-Clause shall not limit liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

17.7 Use of Procuring Entity's Accommodation/ Facilities

17.7.5 The Contractor shall take full responsibility for the care of the Procuring Entity provided accommodation and facilities, if any, as detailed in the Specification, from the respective dates of hand-over to the Contractor until cessation of occupation (where hand-over or cessation of occupation may take place after the date stated in the Taking-Over Certificate for the Works).

17.7.6 If any loss or damage happens to any of the above items while the Contractor is responsible for their care arising from any cause whatsoever other than those for which the Procuring Entity is liable, the Contractor shall, at his own cost, rectify the loss or damage to the satisfaction of the Project Manager.

18 Insurance

18.1 General Requirements for Insurances

18.1.1 In this Clause, "insuring Party" means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

18.1.2 Wherever the Contractor is the insuring Party, each insurance shall be effected with insurers and in terms approved by the Procuring Entity. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

18.1.3 Wherever the Procuring Entity is the insuring Party, each insurance shall be effected with insurers and in terms acceptable to the Contractor. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

18.1.4 If a policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Contractor shall act under the policy on behalf of these additional joint insured except that the Procuring Entity shall act for Procuring Entity's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

18.1.5 Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

18.1.6 The relevant insuring Party shall, within the respective periods stated in **the Particular Conditions of Contract** (calculated from the Commencement Date), submit to the other Party:

a. Evidence that the insurances described in this Clause have been effected, and

b. copies of the policies for the insurances described in Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment] and Sub-Clause 18.3 [Insurance against Injury to Persons and Damage to Property].

18.1.7 When each premium is paid, the insuring Party shall submit evidence of payment to the other Party. Whenever evidence or policies are submitted, the insuring Party shall also give notice to the Project Manager.

18.1.8 Each Party shall comply with the conditions stipulated in each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

18.1.9 Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or at tempts to make) any alteration, the Party first notified by the insurer shall promptly give notice to the other Party.

18.1.10 If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provides at is factory evidence and copies of policies in accordance with this Sub- Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

18.1.11 Nothing in this Clause limits the obligations, liabilities or responsibilities of the Contractor or the Procuring Entity, under the other terms of the Contract or otherwise. Any amounts not insured or not recovered from the insurers shall be borne by the Contractor and/or the Procuring Entity.

18.1.12 Procuring Entity in accordance with these obligations, liabilities or responsibilities. However, if the insuring Party fails to effect and keep in force an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

18.1.13 Payments by one Party to the other Party shall be subject to Sub-Clause2.5 [Procuring Entity's Claims] or Sub- Clause20.1[Contractor's Claims], as applicable.

18.1.14 The Contractor shall be entitled to place all insurance relating to the Contract (including, but not limited to the insurance referred to Clause18) with insurers from any eligible source country.

18.2 Insurance for Works and Contractor's Equipment

18.2.1 The insuring Party shall insure the Works, Plant, Materials and Contractor's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 18.1 [General Requirements for Insurances], until the date of issue of the Taking-Over Certificate for the Works.

18.2.2 The insuring Party shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, and for loss or damage caused by the Contractor in the course of any other operations (including those under Clause11[Defects Liability]).

18.2.3 The insuring Party shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment.

18.2.4 Unless otherwise stated in the Particular Conditions, insurances under this Sub-Clause:

a. Shall be effected and maintained by the Contractor as insuring Party,

b. shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated to the Party actually bearing the costs of rectifying the loss or damage,

c. shall cover all loss and damage from any cause not listed in Sub-Clause17.3 [Procuring Entity's Risks],

d. shall also cover, to the extent specifically required in the tendering documents of the Contract, loss or damage to a part of the Works which is attributable to the use or occupation by the Procuring Entity of another part of the Works, and loss or damage from the risks listed in sub-paragraphs (c), (g) and (h) of Sub-Clause 17.3 [Procuring Entity's Risks], excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not more than the amount stated **in the Particular Conditions** of Contract (if an amount is not so stated, this sub-paragraph (d) shall not apply),and

e. may however exclude loss of, damage to, and rein statement of:

   a. a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below),

   b. a part of the Works which is lost or damaged in order to rein state any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or

workmanship,

c. a part of the Works which has been taken over by the Procuring Entity, except to the extent that the Contractor is liable for the loss or damage, and

d. Goods while they are not in Kenya, subject to Sub-Clause14.5[Plant and Materials intended for the Works].

18.2.5 If, more than one year after the Base Date, the cover described in sub-paragraph (d) above ceases to be available at commercially reasonable terms, the Contractor shall (as insuring Party) give notice to the Procuring Entity, with supporting particulars. The Procuring Entity shall then (i) be entitled subject to Sub- Clause2.5[Procuring Entity's Claims] to payment of an amount equivalent to such commercially reasonable terms as the Contractor should have expected to have paid for such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clause18.1[General Requirements for Insurances].

18.3 Insurance against Injury to Persons and Damage to Property

18.3.1 The insuring Party shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.2 [Insurance for Works and Contractor's Equipment]) or to any person (except persons insured under Sub-Clause18.4 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate.

18.3.2 This insurance shall be for a limit per occurrence of not less than the amount stated in **the Particular Conditions of Contract**, with no limit on the number of occurrences. If an amount is not stated in the **Particular Conditions of Contract**, this Sub-Clause shall not apply.

18.3.3 Unless otherwise stated in the Particular Conditions, the insurances specified in this Sub-Clause:

a. Shall be effected and maintained by the Contractor as insuring Party,

b. Shall be in the joint names of the Parties,

c. shall be extended to cover liability for all loss and damage to the Procuring Entity's property (except things insured under Sub-Clause18.2) arising out of the Contractor's performance of the Contract, and

d. may however exclude liability to the extent that it arises from:

i. the Procuring Entity's right to have the Permanent Works executed on, over, under, in or

ii. through any land, and to occupy this land for the Permanent Works,

iii. damage which is an unavoidable result of the Contractor's obligations to execute the

iv. Works and remedy any defects, and

v. A cause listed in Sub-Clause17.3[Procuring Entity's Risks], except to the extent that cover is

vi. available at commercially reasonable terms.

18.4 Insurance for Contractor's Personnel

18.4.1 The Contractor shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

18.4.2 The insurance shall cover the Procuring Entity and the Project Manager against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Procuring Entity or of the Procuring Entity's Personnel.

18.4.3 The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, the insurance may be effected by the Sub contractor, but the Contractor shall be responsible for compliance with this Clause.

19 Force Majeure

19.1 Definition of Force Majeure

19.1.1 In this Clause, "Force Majeure" means an exceptional event or circumstance:

a. Which is beyond a Party's control,

b. Which such Party could not reasonably have provided against before entering in to the Contract,

c. which, having arisen, such Party could not reasonably have avoided or overcome, and

d. which is not substantially attributable to the other Party.

19.1.2 Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,

ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,

iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,

iv) munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and

v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

19.2 Notice of Force Majeure

19.2.1 If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

19.2.2 The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.

19.2.3 Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

19.3 Duty to Minimize Delay

Each Party shall at all times use all reasonable endeavors to minimize any delay in the performance of the Contract as a result of Force Majeure. A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

19.4 Consequences of Force Majeure

19.4.1 If the Contractor is prevented from performing his substantial obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims]to:

a. an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4

[Extension of Time for Completion], and

b. if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 19.1 [Definition of Force Majeure] and, in sub-paragraphs(ii)to(iv), occurs in Kenya, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Sub- Clause18.2[Insurance for Works and Contractor's Equipment].

19.4.2 After receiving this notice, the Project Manager shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

19.5 Force Majeure Affecting Subcontractor

If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

19.6 Optional Termination, Payment and Release

19.6.1 If the execution of substantially all the Works in progress is prevented for a continuous period of 84days by reason of Force Majeure of which notice has been given under Sub-Clause19.2 [Notice of Force Majeure], or for multiple periods which total more than 140days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment].

19.6.2 Upon such termination, the Project Manager shall determine the value of the work done and issue a Payment Certificate which shall include:

a. The amounts payable for any work carried out for which a price is stated in the Contract;

b. The Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and beat the risk of) the Procuring Entity when paid for by the Procuring Entity, and the Contractor shall place the same at the Procuring Entity's disposal;

c. other Cost or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works;

d. the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his Procuring Entity (or to any other destination at no greater cost); and

e. the Cost of repatriation of the Contractor's staff and labor employed wholly in connection with the Works at the date of termination.

19.7 Release from Performance

Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

a) The Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and

b) The sum payable by the Procuring Entity to the Contractor shall be the same as would have

been payable under Sub-Clause19.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause19.6.

20 Settlement of Claims and Disputes

20.1 Contractor's Claims

20.1.1 If 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 28days after the Contractor became aware, or should have become aware, of the event or circumstance.

20.1.2 If 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.

20.1.3 The 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.

20.1.4 The 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 Contractor 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.

20.1.5 Within 42days 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 28days 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.

20.1.6 Within 42days 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 nevertheless give his response on the principles of the claim within the above defined time period.

20.1.7 Within the above defined period of 42days, 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-Clause8.4 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

20.1.8 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.

20.1.9 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-Clause20.2 [Settlement of Claims and Disputes].

20.1.10 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.

20.2 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 20.1 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.

20.3 Matters that may be referred to arbitration

Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion of the Works or abandonment of the Works 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 Works or termination or alleged termination of the Contract, unless the Procuring Entity and the Contractor agree otherwise in writing.

20.4 Arbitration

20.4.1 Any claim or dispute between the Parties arising out of or in connection with the Contract not settled amicably in accordance with Sub-Clause 20.3 shall be finally settled by arbitration. Arbitration shall be conducted as follows:

a) If the contract is with foreign contractors, arbitration proceedings shall be administered by the arbitration institution designated in the Particular Conditions of Contract, and conducted under the rules of arbitration of such institution; or, if so specified in the Particular Conditions of Contract, international arbitration in accordance with the arbitration rules of the United Nations Commission on International Trade Law (UNCITRAL); or if neither an arbitration institution nor UNCITRAL arbitration rules are specified in the Particular Conditions of Contract, with proceedings administered by the International Chamber of Commerce (ICC) and conducted under the ICC Rules of Arbitration; by one or more arbitrators appointed in accordance with said arbitration rules;

b) If the Contract is with national contractors, arbitration with proceedings conducted in accordance with the Arbitration Laws of Kenya.

20.4.2 The place of arbitration shall be the neutral location specified in the Particular Conditions of Contract; and the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language].

20.4.3 The 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.

20.4.4 Neither Party shall be limited in the proceedings before the arbitrators to the evidence, or to the reasons for dissatisfaction given in its Notice of Dissatisfaction.

20.4.5 Arbitration may be commenced prior to or after completion of the Works. 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 Works.

20.4.6 The 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.

20.5 National arbitration with proceedings

20.5.1 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) Architectural Association of Kenya

ii) Institute of Quantity Surveyors of Kenya

iii) Association of Consulting Engineers of Kenya

iv) Chartered Institute of Arbitrators (Kenya Branch)

v) Institution of Engineers of Kenya

20.5.2 The institution written to first by the aggrieved party shall take precedence over all other institutions.

20.5.3 The arbitration may be on the construction of this Contract or on any matter or thing of whatsoever nature arising thereunder or in connection therewith, 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.

20.5.4 Provided 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.

20.5.5 Notwithstanding 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.

20.5.6 The 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.

20.5.7 The 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.

20.5.8 The award of such Arbitrator shall be final and binding upon the parties.

20.6 Failure to Comply with Arbitrator's Decision

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.

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
1.4	For **notices**, the Procuring Entity's address shall be: **The Managing Director & CEO,** **Geothermal Development Company Ltd (GDC)** **Kawi House, South C Bellevue Off Mombasa Road, Tel: 0719037000, 0719036000** **P.O. Box 100746 – 00101** **Nairobi, Kenya** Any notice given under the Agreement shall be in writing and may be served: i. personally; ii. by registered or recorded delivery mail; iii. by e-mail, telex or facsimile transmission (the latter confirmed by telex or post); or iv. by any other means which any party specifies by notice to the others. Notice shall be deemed to have been served: i. if it was served in person, at the time of service; ii. if it was served by post, 72 hours after it was posted; and If it was served by e-mail, telex or facsimile transmission, at the time of transmission.
	The Authorized Representatives are: For the Procuring Entity: **The Managing Director & CEO,** **Geothermal Development Company Ltd (GDC)** **Kawi House, South C Bellevue Off Mombasa Road, Tel: 0719037000, 0719036000** **P.O. Box 100746 – 00101** **Nairobi, Kenya** For the security services Provider: _____ *[Name, Postal Address, Email, Telephone Number]*
	The date on which this Contract shall come into effect is *Immediately after signing the contract*
	The Commencement date is the date the contract becomes effective.

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	Force Majeure 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. **Effects of Force Majeure** If a Party is prevented from or delayed in performing an obligation in this Contract by reason of Force Majeure, the affected Party shall: a) Be relieved from the consequences of its failure to perform that obligation on a day to day basis; b) Promptly notify the other party of the occurrence of the Force Majeure as soon as the reasonably practicable and the extent to which the Force Majeure suspends the Party's obligation under the Contract; and c) Shall use all reasonable endeavors to overcome the consequences of the Force Majeure event and resume performance of its obligations as soon as possible after the Force Majeure condition ceases. **Force Majeure Termination** If the event of Force Majeure continues beyond a period of thirty (30) days, the parties shall meet in good faith to consult, if no such solution is found, either party shall be entitled to terminate the Contract through a written notice of at least seven (7) days. **Payments During Force Majeure** During the period of their inability to performas a result of an event of Force Majeure, the Service provider shall be entitled to be paid under the terms of this Contract, for services delivered during such period for the purposes of the delivery fully and properly delivered as at the time of the occurrence of the force majeure event.
	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 - Has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract - Has informed the other Party as soon as possible about the occurrence of such an event.
	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.
	Termination for Default GDC may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Service Provider, terminate this Contract in whole or in part: a) If the Service Provider fails to deliver the Goods and Services within the period(s) specified in the Contract, or within any extension thereof granted by the GDC; b) If the Goods and Services delivered by the Service Provider do not conform to the Standards specified in the Contract; c) If the Service Provider fails to perform any other obligation(s) under the Contract; d) If the Service Provider, in the judgment of

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	a) the GDC has engaged in corrupt or fraudulent practices in competing for or in executing the Contract; b) If the Service Provider becomes insolvent or bankrupt; GDC may at any time terminate this Agreement by giving written notice to the Service Provider if the Service Provider becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Service Provider, provided that such termination will not produce or affect any right of action or remedy which has accrued or will accrue thereafter to GDC; In the event that the GDC terminates the Contract in whole or in part, it may procure, upon such terms and in such manner, as it deems appropriate, Goods and Services similar to those undelivered, and the Service Provider shall be liable to the GDC for any excess costs incurred. **Termination by Notice** Either party, at its sole discretion, may at any time by written notice terminate the Contract by giving no less than Thirty (30) days' notice in writing. **Termination for Convenience** The GDC by written notice sent to the Tenderer may terminate the contract in whole or in part, at any time for its convenience. The notice of termination shall specify that the termination is for the GDC's convenience, the extent to which performance of the Tenderer of the contract is terminated and the date on which such termination becomes effective. For the remaining part of the contract after termination the GDC may elect to cancel the supply and pay to the Tenderer the amount for partially delivered goods. **Termination by Mutual Consent** By mutual written agreement, the Purchaser and the Tenderer may agree to terminate the contract. The agreement shall provide that the termination is by mutual agreement, the extent to which the contract is terminated and the effects of such termination on each party's obligations. **Termination by Insolvency** If the Tenderer becomes insolvent or bankrupt; the Purchaser may at any time terminate this Agreement by giving written notice to the Tenderer. In this event, termination will be without compensation to the Service provider, provided that such termination will not produce or affect any right of action or remedy which has accrued or will accrue thereafter to the Purchaser. On termination of this Agreement, howsoever terminated, the Contractor shall be permitted to remove all its equipment which may have been placed by the Contractor upon the employer's premises.
3.6.1	If the Service Provider fails to perform the Services within the period(s) specified in the Contract and/or offers poor Services contrary to the terms and conditions of the Contract, GDC shall, without prejudice to its other remedies under the Contract, deduct, as liquidated damages, from the amount of approved invoices due for payment to the Service Provider or the Performance Bond, a sum equivalent to the value of the unperformed Services or poor Services computed at the rate of the prevailing mean commercial lending rate as determined by Central Bank of Kenya. In the event the amount of liquidated damages exceeds the value of the Performance Bond, the Contract shall automatically be terminated by GDC and the Service Provider held liable for any

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	such costs incurred by GDC following the termination of the Contract.
	No interest shall be paid to the Service Provider for any delayed payment
	Dispute Resolution If any question, dispute or claim arises out of or in connection with this contract, including any question regarding its existence, validity, performance or termination (a dispute) which either party has notified to the other senior management personnel of each party shall meet and diligently attempt in good faith to resolve the dispute for a period of sixty (60) days following one party's written request to the other party for such a meeting. Arbitration – N/A
	Limitation of Liability To the fullest extent permitted by law, GDC, its officers, directors, employees, agents, and sub-contractors, shall not be liable for any claims, losses, costs, or damages of whatsoever nature and howsoever arising to the Service Provider, and anyone claiming by, through, or under the Service Provider, resulting from or in any way related to this Contract from any cause or causes, including but not limited to any direct, indirect, general, special, punitive, incidental or consequential damages, loss of income or profit, loss of or damage to property, claims of third parties or other losses of any kind or character.
	Non-Waiver No relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, neither shall any waiver by either party of any breach of Contract operate as a waiver of any subsequent or continuing breach of Contract. Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.
	Severability If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.
	The Performance Security shall be in the amount of 10% of the Contract Price in the form of a **bank guarantee** issued by a Kenyan bank valid for 30 days after completion of the assignment including warranty period if any. The performance security shall be in the form of an on demand bank guarantee in favour of the procuring entity. The procuring entity shall not accept performance guarantees issued by microfinance or insurance firms.
	The term of this contract shall be -from the effective date.
	The service provider shall render the services in the procuring entity's project Area

Number of GC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	specified under this tender

SECTION IX - PARTICULAR CONDITIONS OF CONTRACT

The following Particular Conditions shall supplement the GCC. Whenever there is a conflict, the provisions here in shall prevail over those in the GCC.

Part A - Contract Data

Conditions	Sub-Clause	Data
Procuring Entity's name and address	Heading	Geothermal Development Company Ltd P.O Box 100746-00101 Nairobi
Name and Reference No. of the Contract	Heading and 3.1.1	
Project Managers Name and address	Heading and 3.1.1	General Manager, Geothermal Resource Development
Contractor's Representative's name	4.3.1	*[insert the name of the Contractor's Representative agreed by the Procuring Entity prior to Contract signature]*
Key Personnel names	6.9.1	*[insert the name of each Key Personnel agreed by the Procuring Entity prior to Contract signature]*
Time for Completion	1.1.	_____days *If Sections are to be used, refer to Table: Summary of Sections below*
Defects Notification Period	1.1	_____days
Sections	1.1	*If Sections are to be used, refer to Table: Summary of Sections below*
Electronic transmission systems	1.3	N/a
Time for the Parties entering into a Contract Agreement	1.6	Within 28 days
Commencement Date	8.1.1	Service delivery shall commence on the effective date of this contract
Time for access to the Site	2.1	No later than _____days after Commencement Date
Project Manager's Duties and Authority	3.1.6 (b) (ii)	Variations resulting in an increase of the Accepted Contract Amount in excess of_____% shall require approval of the Procuring Entity._
Performance Security	4.2.1	The performance security shall be 10% of the cost of the geothermal power plant. The performance security/guarantee shall be issued by a bank operating in Kenya or a bank with a local correspondence acceptable to GDC and should be valid for 30 days after completion of the contract period.
Normal working hours	6.5	Specify

Conditions	Sub-Clause	Data
Delay damages for the Works	8.7 & 14.15.1(b)	_____ % of the Contract Price per day. *If Sections are to be used, refer to Table: Summary of Sections below*
Maximum amount of delay damages	8.7	_____% of the final Contract Price.
Provisional Sums	13.5. (b)(ii)	*[If there are Provisional Sums, insert a percentage for adjustment of Provisional Sums]* _____%
Adjustments for Changes in Cost	13.8.3	Period "n" applicable to the adjustment multiplier "Pn": _____ *[Insert the period if different from one (1) month; if period "n" is one (1) month, insert "not applicable"]*
Total advance payment	14.2.1	N/A
Repayment amortization rate of advance payment	14.2.5 (b)	_____%
Percentage of Retention	14.3.2 (c)	_____%
Limit of Retention Money	14.3.2 (c)	_____% of the Accepted Contract Amount
Plant and Materials	14.5.3(b)(i)	If Sub-Clause 14.5 applies: Plant and Materials for payment Free on Board _____ *[list]*.
	14.5.3(c)(i)	Plant and Materials for payment when delivered to the Site _____ *[list]*.
Minimum Amount of Interim Payment Certificates	14.6.2	_____ % of the Accepted Contract Amount.
Publishing source of commercial interest rates for financial charges in case of delayed payment	14.8.2	Specify _____% rate per month of delayed payment.
Maximum total liability of the Contractor to the Procuring Entity	17.6.2	*[Select one of the two options below as appropriate]* The product of_____ *[insert a multiplier less or greater than one]* times the Accepted Contract Amount, *or* _____ *[insert amount of the maximum total liability]*
Periods for submission of insurance: a. evidence of insurance. b. relevant policies	18.1.6	*[Insert period for submission of evidence of insurance and policy. Period may be from 14 days to 28 days.]* _____days _____days
Maximum amount of deductibles for insurance of the Procuring Entity's risks	18.2.4 (d)	*[Insert maximum amount of deductibles]*
Minimum amount of third-party insurance	18.3.2	*[Insert amount of third-party insurance]*
The place of arbitration	20.4.2	*Insert city and country*

SECTION IX - CONTRACT FORMS

Table of Forms

FORM No. 1 - NOTIFICATION OF INTENTION TO AWARD

FORM No. 2 – REQUEST FOR REVIEW

FORM No. 3 - LETTER OF AWARD

FORM No. 4 - CONTRACT AGREEMENT

FORM No. 5 - PERFORMANCE SECURITY [Option 1 - Unconditional Demand Bank Guarantee] FORM No. 6- PERFORMANCE SECURITY [Option 2– Performance Bond]

FORM No. 7 - ADVANCE PAYMENTSECURITY

FORM No. 8- RETENTION MONYSECURITY

FORM NO. 9 BENEFICIAL OWNERSHIP DISCLOSURE

FORMNo1: 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 Tender Information Form on the format below.

FORMAT

1. For the attention of Tenderer's Authorized Representative

   i) Name: *[insert Authorized Representative's name]*

   ii) Address: *[insert Authorized Representative's Address]*

   iii) Telephone: *[insert Authorized Representative's telephone/ fax numbers]*

   iv) 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.]

2. Date of transmission: [*email*] on [*date*] (local time) This

   Notification Is sent by (*Name and designation*)_____

3. Notification of Intention to Award
   i) Procuring Entity: *[insert the name of the Procuring Entity]*
   ii) Project: *[insert name of project]*
   iii) Contract title: *[insert the name of the contract]*
   iv) ITT No: *[insert ITT reference number from Procurement Plan]*

   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:

4. Request a debriefing in relation to the evaluation of your tender by submitting a Procurement-related Complaint in relation to the decision to award the contracts.

   a) The successful tenderers
      i) Name of successful Tender_____

      ii) Address of the successful Tender_____

      iii) Contract price of the successful Tender Kenya Shillings_____ (in words)

   b) Other Tenderers

      Names of all Tenderers that submitted a Tender. If the Tender's price was evaluated include the evaluated price as well as the Tender price as read out.

S/No.	Name of Tender	Tender Price as read out	Tender's evaluated price (Note a)	One Reason Why Not Evaluated
1				
2				
3				
4				
5				

(Note a) State NE if not evaluated

5. How to request a debriefing

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

b) 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 (5) Business Days of receipt of this Notification of Intention to Award.

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

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

ii) Title/position: [*insert title / position*]

ii) Agency: [*insert name of Procuring Entity*]

iii) Email address: [*insert email address*]

d) If your request for a debriefing is received within the 3 Days deadline, we will provide the debriefing within five (3) 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 (3) 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.

e) 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.

f) 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) Days from the date of publication of the Contract Award Notice.

6. <u>How to make a complaint</u>

a) Period: Procurement-related Complaint challenging the decision to award shall be submitted by midnight, [*insert date*] (local time).

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

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

ii) Title/position: [*insert title / position*]

iii) Agency: [*insert name of Procuring Entity*]

iv) Email address: [*insert email address*]

c) 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.

d) Further information: For more information refer to the Public Procurement and Disposals Act 2015 and its Regulations available from the Website www.ppra.go.ke.

You should read these documents before preparing and submitting your complaint.

e) There are four essential requirements:

i) You must bean' 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.

ii) The complaint can only challenge the decision to award the contract.

iii) You must submit the complaint within the period stated above.

iv) You must include, in your complaint, all of the information required to support your complaint.

7. Standstill Period

i) DEADLINE: The Standstill Period is due to end at midnight on *[insert date]* (local time).

ii) The Standstill Period lasts ten (14) Days after the date of transmission of this Notification of Intention to Award.

iii) The Standstill Period may be extended as stated in paragraph Section 5 (d) above.

If you have any questions regarding this Notification please do not hesitate

to contact us. On behalf of the Procuring Entity:

Signature: _____

_____

_____

Name: _____

_____

_____

Title/position: _____

Telephone: _____

_____

Email: _____

_____

_____

FORM NO. 2- REQUEST FOR REVIEW

FORM FOR REVIEW (r.203(1))

PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD

APPLICATION NO…….OF……..….20……...

BETWEEN

……...…….APPLICANT

AND

……RESPONDENT (Procuring Entity)

Request for review of the decision of the…… (Name of the Procuring Entity of ……dated the…day of ……20…….in the matter of Tender No……..…of ……..20….. for ..... (Tender description).

REQUEST FOR REVIEW

I/We……,the above named Applicant(s), of address: Physical address…….P. O. Box No……. Tel. No……..Email ……, hereby request the Public Procurement Administrative Review Board to review the whole/part of the above mentioned decision on the following grounds , namely:

1.

2.

By this memorandum, the Applicant requests the Board for an order/orders that:

1.

2.

SIGNED ……. (Applicant) Dated on…….day of ……/…20……

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

SIGNED

Board Secretary

FORM NO 3: LETTER OF AWARD

[letterhead paper of the Procuring

Entity] [date]

To: *[name and address of the Contractor]*
This is to notify you that your Tender dated.....*[date]* for execution of the.....*[name of the Contract and identification number, as given in the Contract Data]* for the Accepted Contract Amount.....*[amount in numbers and words] [name of currency]*, as corrected and modified in accordance with the Instructions to Tenderers, is here by accepted by…… *(name of Procuring Entity).*

You are requested to furnish the Performance Security within 28days in accordance with the Conditions of Contract, using, for that purpose, one of the Performance Security Forms included in Section VIII, Contract Forms, of the Tender Document.

Authorized Signature:

Name and Title of Signatory:

Name of Procuring Entity:

Attachment: *Contract*

Agreement:

FORM NO 4: CONTRACT AGREEMENT

THIS AGREEMENT made the_____day of_____, 20_____, between
_____of _____ (hereinafter "the Procuring
Entity"), of the one part, and_____of
_____(hereinafter "the Contractor"), of the other part:

WHEREAS the Procuring Entity desires that the Works known as _____shoul
d be executed by the Contractor, and has accepted a Tender by the Contractor for the execution and completion of these Works and the remedying of any defects there in,

The Procuring Entity and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to the min the Contract documents referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

   a) The Letter of Acceptance

   b) The Letter of Tender

   c) The addenda Nos_____(if any)

   d) The Particular Conditions of Contract

   e) The General Conditions of Contract.

   f) The Specifications

   g) The Drawings*;* and

   h) The completed Schedules and any other documents forming part of the contract.

3. In consideration of the payments to be made by the Procuring Entity to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Procuring Entity to execute the Works and to remedy defects there in inconformity in all respects with the provisions of the Contract.

4. The Procuring Entity hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

   IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the Laws of Kenya on the day, month and year specified above.

Signed and sealed by_____*(for the Procuring Entity)*

Signed and sealed by_____*(for the Contractor).*

FORM NO. 5 - PERFORMANCE SECURITY
[Option 1 - Unconditional Demand Bank Guarantee]

[Guarantor letterhead]

Beneficiary: *[insert name and Address of* Procuring Entity*]* **Date:** *[Insert date of issue]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

1. We have been informed that_____(hereinafter called "the Contractor") has entered into Contract No._____dated_____ _____with (*name of Procuring Entity*)_(the Procuring Entity as the Beneficiary), for the execution of _____(herein after called" the Contract").

2. Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

3. At the request of the Contractor, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of_____(*in words*),[1] 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 there in.

4. This guarantee shall expire, no later than the…….... Day of……,2...…[2], and any demand for payment under it must be received by us at the 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. 6- PERFORMANCESECURITY [Option2–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]*

1. By this Bond _____as Principal (hereinafter called "the Contractor") and_____*]* as Surety (hereinafter called "the Surety"), are held and firmly bound unto____*]* as Obligee (hereinafter 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 there to, which to the extent here in provided for, are by reference made part here of and are here in 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 there under, 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 here under, the amount set for thin 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 here in 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 corporate 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. 7 - ADVANCE PAYMENT SECURITY [Demand Bank Guarantee]

[Guarantor letterhead]

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 Contractor") has entered in to 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 _____(*in words*) is to be made against an advance payment guarantee.

3. At the request of the Contractor, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of_____(*in words*_____)[1] 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 Contractor 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 Contractor 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 ,[2] 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*]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

Manufacturer Authorization Form

To:

Geothermal Development Company Limited
Kawi House Offices,
P. O. Box 100746-00101
Nairobi

WHEREAS …….
[name of the Manufacturer]

who are established and reputable manufacturers of*[Insert Equipment]* having factories at……*[address of factory]*do hereby authorize……*[name and address of Agent]* to submit a tender, and subsequently negotiate and sign the Contract with you against tender No…….. … *[reference of the Tender]* for the above goods manufactured by us.

We hereby extend our full guarantee and warranty as per the General Conditions of Contract to design, manufacture, supply, install, test and commission the Geothermal Power Plant Equipment at Paka by the above firm against its Invitation for Tenders.

_____

[signature for and on behalf of Manufacturer]

Note: This letter of authority should be on the letterhead of the Manufacturer and should be signed by a person competent.

DETAILS OF SUB-CONTRACTORS

1. If the Tenderer wishes to sublet any portions of the project under any heading, he must give below details of the sub-contractors he intends to employ for each portion.

   Failure to comply with this requirement may invalidate the tender,

   (I) Portion of works to be sublet:
   ……..
   (II) Full name of Sub-contractor and contact address:
   …….
   …….
   (III) Sub-contractor's experience of similar works carried out in the last 3 years with Contract Value:
   ……

[Signature of Tenderer] [Date]

FORM OF WRITTEN POWER-OF-ATTORNEY

The Tenderers shall state here below the name and address of its representative who is authorized to receive on its behalf correspondence in connection with this Tender.

……
[Name of Tenderer's Representative in block letters]

……..
[Address of Tenderer's Representative]

……..
[Signature of Tenderer's Representative]

CERTIFICATE OF TENDERER'S VISIT TO SITE

This is to certify that
[Name/s] ……
……..
Being the authorized representative/Agent of [*Name of Tenderer*]
……
……..
participated in the organized inspection visit of the site of the works for the
the "**design, procurement/manufacturing, supply, installation, testing and commissioning**" of additional wells connection to the Menengai Steam Gathering System this……Day of ……20 ……..

Signed ……..
[Procurement Entity's Representative]

……...
Date

FORM NO. 8 BENEFICIAL OWNERSHIP DISCLOSURE FORM
d 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/Description:_____*[insert name of the assignment]* to:_____*[insert complete name of Procuring Entity]*

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 Beneficial 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)**
1.	Full Name		Directly---------- % of shares Indirectly---------- % of shares	Directly……..% of voting rights Indirectly----------% of voting rights	1. Having the right to 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 indirectly?: Direct…… Indirect……...	1. Exercises significant influence or control over the Company body of the Company (tenderer) Yes -----No---- 2. Is this influence or control exercised directly or indirectly? Direct…….. Indirect……
	National identity card number or Passport number					
	Personal Identification Number (where applicable)					
	Nationality					
	Date of birth *[dd/mm/yyyy]*					
	Postal address					
	Residential address					
	Telephone number					
	Email address					
	Occupation or profession					
2.	Full Name		Directly---------- % of shares Indirectly---------- % of shares	Directly……..% of voting rights Indirectly----------% of voting rights	1. Having the right to 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 indirectly?: Direct……	1. Exercises significant influence or control over the Company body of the Company (tenderer) Yes -----No---- 2. Is this influence or control exercised directly or indirectly?
	National identity card number or Passport number					
	Personal Identification Number (where applicable)					
	Nationality(ies)					
	Date of birth *[dd/mm/yyyy]*					
	Postal address					
	Residential address					
	Telephone					

	Details of all Beneficial 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)**
	number				Indirect…… ……...	Direct…… ….. Indirect…… ……
	Email address					
	Occupation or profession					
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]*

Designation of the person signing the Tender: ..... [insert complete title of the person signing 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