



# ENERGY FIJI LIMITED

*TURNKEY DESIGN & BUILD, MANUFACTURE, SUPPLY, INSTALL AND COMMISSION  
145KV SF-6 CIRCUIT BREAKER AT EFL'S WAILOA SUBSTATION*

**TENDER NO: MR 217/2024**

# INVITATION TO TENDER

**Date: 22<sup>nd</sup> June, 2024**

**Tender No: MR 217/2024**

Energy Fiji Limited (“The Employer”) invites sealed bids from suitable switchgear manufacturers and suppliers to undertake Turnkey Design and Build, manufacture, supply, installation, testing and commissioning of 145kV Circuit Breaker at Wailoa Substation. The tenderer is required to submit a bid for:

The complete design, manufacture, test, supply, installation and commissioning of two (2) 145kV, live tank, three phase, 3000A SF-6 circuit breakers. One gang pole circuit breaker will be installed at Wailoa Substation and one single pole circuit breaker as spare for EFL’s existing 132kV Transmission circuits. The supply to include manufacturers mandatory spares and other spares as listed in the scope of work.

The circuit breakers are to be accompanied with steel support mounting columns and with all other accessories and terminals.

The bidder shall also include the removal of the existing circuit breaker, steel structures, jumper cables, control cables that maybe required to install the proposed 145kV circuit breaker. The bidder will also be responsible for supply, installation and wiring of new control cables on the Circuit Breaker, Protection & Control Panel and Mimic Panel with interlock wiring as well.

All tenders for the contract shall be submitted on the appropriate forms provided and shall include the completed price schedule, technical schedule and schedules of experience etc. The bid shall be on the basis of a lump sum contract based on firm prices.

Bidders may obtain further information from, acquire the bidding documents, and arrange for site visits (if required) from our Supply Chain Office on phone (+679) 3224360 or (+679) 9992400 or email us on [tenders@efl.com.fj](mailto:tenders@efl.com.fj)

The tender bids SHALL be submitted electronically at the following location <https://www.tenderlink.com/efl>

Register your interest and submit a soft copy response by viewing 'Current Tenders' at: <https://www.tenderlink.com/efl>

The bid shall be typed and shall be signed by a person or persons duly authorized to sign on behalf of the bidder, as the case may be. All pages of the bid where entries or amendments have been made shall be initialled by the person or persons signing the bid.

The bid shall contain no alterations, omissions or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the persons signing the bid.

The bidder shall submit original PDF & AutoCAD copies of the bids & associated drawings in the bid submission link.

Mandatory Site Visits are as follows:

1. Wailoa Substation – 25/06/2024 at 2.00pm Fiji Time

*EFL will not cater for any separate visits for this tender aside from the dates mentioned above. Unless the bidders notifies prior to the scheduled site visit, then a separate site visit can be accommodated depending on the availability of the project manager. For all overseas bidders, they can send their local representative to attend to this site visits.*

The deadline for submission of tenders shall be **1600hrs Fiji Time on Wednesday, 17<sup>th</sup> July, 2024.**

During evaluation of tenders, the ELF will invite a tenderer or tenderers for discussions, presentations and any necessary clarification before awarding of the contract.

Map of Viti Levu showing Wailoa, Vuda and Cunningham Substations and the 132kV transmission line

Energy Fiji Limited

132kV Transmission Lines



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## SECTION 1 – INSTRUCTIONS TO TENDER

- 1. Scope of Tender**

  - 1.1 Energy Fiji Limited (hereinafter referred to as "the Employer"), wishes to receive bids for Turnkey Design and Build, manufacture, supply, installation, testing and commissioning of 145kV Circuit Breaker at Wailoa Substation for 132/33kV Transformer T5 as defined in these tender documents (hereinafter referred to as "the Works").
  - 1.2 The successful tenderer will be expected to complete the Works within eighteen (18) months from the date of signing of contract. The bidder shall factor in all the cost till award letter/ contract is given to them and till they supply, install and commission the circuit breaker.
- 2. Source of Funds**

  - 2.1 The Energy Fiji Limited has a capital works program which is self-funded and intends to use part of the funds for the contract ("the Contract") for which this Invitation to Tender is issued.
- 3. Eligible Tenders**

  - 3.1 **Tenderers shall be manufacturers of the major plant and equipment specified, or a contracting arm preferred by the manufacturer.**
  - 3.2 Tenderers shall provide such evidence of their continued eligibility satisfactory to the Employer as the Employer shall reasonably request.
  - 3.3 Tenderers shall not be under a declaration of ineligibility for corrupt or fraudulent.
  - 3.4 This Invitation to tender is open to tenderers who have sound financial background and have previous experience in handling such turnkey projects.
- 4. Eligible Materials, Equipment and Services**

  - 4.1 The materials, equipment, and services to be supplied under the Contract shall have their origin from reputable companies from various countries and all expenditures made under the Contract will be limited to such materials, equipment, and services. At the Employer's request, bidders may be required to provide evidence of the origin of materials, equipment, and services.
  - 4.2 For purposes of Sub-Clause 4.1 above, "services" means the works and all project-related services including design services.
  - 4.3 For purposes of Sub-Clause 4.1 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing or substantial or major assembling of components, a commercial recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.
  - 4.4 The materials, equipment and services to be supplied under the Contract shall not infringe or violate any industrial property or intellectual property rights or claim of any third party.
- 5. Qualification of the Tenderer**

  - 5.1 To be qualified for award of Contract, tenderers shall:

    - (a) **submit a written power of attorney** authorizing the signatory of the tender to commit the tenderer; and
    - (b) Specify joint venture memberships, certification and qualification as equipment manufacturer, financial capability, technical capability, supply and installation facilities with comparable technical parameters, manufacturing and installation capability, work in hand, future commitments and current litigation.
    - (c) Submit proposals regarding work methods, scheduling and resourcing which shall be, provided in sufficient detail to confirm the bidders' capability to complete the works in accordance with the specifications and the time for completion.
  - 5.2 Firms shall also submit proposals of work methods and schedule in sufficient detail to demonstrate the adequacy of the tenderers proposals to meet the Employer's Requirements and the completion time referred to in Sub-Clause 1.2 above.
- 6. One Bid per Bidder**

  - 6.1 Each tenderer shall submit only one tender either by itself, or as a partner in a joint venture. A tenderer who submits or participates in more than one tender will cause all those bids to be rejected.

- 7. Cost of Tender** 7.1 The Tenderer shall bear all costs associated with the preparation and submission of its tender and the Employer will In no case be responsible or liable for those costs.
- 8. Site Visit** 8.1 The proposed Mandatory site visit shall be as follows:  
 1. **25<sup>th</sup> June 2024, Wailoa Substation 2.00pm**
- The tenderer is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the tender and entering into a contract for the design-build and completion of the Works. The costs of visiting the Site shall be at the tenderers own expense.
- 8.2 The tenderer and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the tenderer, its personnel and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the inspection.
- 9. Content of Tender Documents** 9.1 The tender documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause 11:
- |         |   |  |
|---------|---|--|
| Section | 1 | Invitation for Tender                  |
|         | 2 | Instructions to Tender                 |
|         | 3 | General Conditions of Contract         |
|         | 4 | Conditions of Particular Application   |
|         | 5 | General Specifications                 |
|         | 6 | Technical Specifications               |
|         | 7 | Schedules of supplementary Information |
|         | 8 | Schedule of Tender Forms               |
|         | 9 | Schedule of prices                     |
|         |   | Schedule of Drawings                   |
- 9.2 The Tenderer is expected to examine carefully the contents of the Tender documents. Failure to comply with the requirements of tender submission will be at the tenderer's own risk. Pursuant to Clause 27, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.
- 10. Clarification of Tender Documents** 10.1 A prospective tenderer requiring any clarification of the tender documents may notify the Employer in writing. Bidders may obtain further information from, acquire the bidding documents, and arrange for site visits (if required) from our Supply Chain Office on phone (+679) 3224360 or (+679) 9992400 or email us on tenders@efl.com.fj
- 11.1 At any time prior to the deadline for submission of tender, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective tenderer, modify the tender documents by issuing addenda.
- 11. Amendment of Tender Documents** 11.2 Any addendum thus issued shall be part of the tender documents pursuant to Sub-Clause 9.1, and shall be communicated in writing or by fax to all purchasers of the tender documents. Prospective tenderers shall acknowledge receipt of each addendum by email and fax to the Employer.
- 11.3 To afford prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer may extend the deadline for submission of bids, in accordance with Clause 23.
- 12.1 The tender, and all correspondence and documents related to the bid, exchanged between the tenderer and the Employer shall be written in the English language.
- 12. Language of Tender** 13.1 The tender submitted by the tenderer shall comprise of single envelope and shall contain the following:
- (i) Form of Tender and Appendix to Tender;
- 13. Documents Comprising the**



|  |      |   |
|--|------|---|
| <b>Tender</b>                              |      | <ul style="list-style-type: none"> <li>(ii) Power of Attorney;</li> <li>(iii) Information on Qualification;</li> <li>(iv) Confirmation of Eligibility;</li> <li>(v) Schedule of Major Items of Equipment</li> <li>(vi) Schedules of Prices (as per Section 8, Part 2): <ul style="list-style-type: none"> <li><i>I. Price Schedule of Main Items</i></li> <li><i>II. Alternative Offers</i></li> <li><i>III. Recommended Tools &amp; Spare Parts</i></li> <li><i>IV. Summary of Prices</i></li> </ul> </li> <li>(vii) Schedule of Technical Particulars &amp; Guarantees</li> <li>(viii) Schedule of Work Programme</li> <li>(ix) Schedule of Departures from Specification</li> <li>(x) Schedule of Tenderer's Statement of Experience</li> <li>(xi) Schedule of Financial Information</li> <li>(xii) Schedule of Bio Data for Tenderer's Personnel to be engaged in Project</li> <li>(xiii) Schedule of Tenderer's Tools &amp; Equipment</li> <li>(xiv) Schedule of Other Documents and Drawings to be submitted with the bid</li> <li>(xv) Any other materials required to be completed and submitted by tenderers in accordance with these Instructions to Tender.</li> </ul>   |
| <b>14. Tender Form and Price Schedules</b> | 14.1 | The Bidder shall complete the Tender Form and the appropriate Price Schedules furnished in the tender documents in the manner and detail indicated therein, following the requirements of Clauses 15 and 16.  |
| <b>15. Tender Prices</b>                   | 15.1 | Unless specified otherwise in Employer's Requirements, tenderers shall quote for the entire facilities on a "single responsibility" basis such that the total price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the tender documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the facilities and, where so required by the bidding documents, the acquisition of all permits, approvals and licenses, etc., operation maintenance and training services and such other items and services as may be specified in the tender documents, all in accordance with the requirements of the Conditions of Contract.   |
|  | 15.2 | Tenderers shall give a breakdown of the prices in the manner and detail called for in the Schedules of Prices.  |
|  | 15.3 | In the Schedules, Tenderers shall give the required details and a breakdown of their prices, including all taxes, duties, levies, and charges payable in the Employer's country as of twenty eight (28) days prior to the deadline for submission of bids, as follows: <ul style="list-style-type: none"> <li>(a) Design including all necessary drawings and documentation for the Work.</li> <li>(b) Plant and equipment to be supplied from outside the Employer's country (Schedules of Prices) shall be quoted on a CFR to site basis. In addition, estimated ocean freight charges, installation charges. Installation works and Other Services shall include rates or prices for all labour, contractor's equipment, materials, consumables and all matters and things of whatsoever nature, the provision of operations and maintenance manuals, training, etc. where identified in the bidding documents, as necessary for the proper execution of the Installation works and Other Services. The local contractors or suppliers can quote in FJD VEP.<br/><b>Note: EFL has a marine insurance cover hence the bid shall exclude this component.</b></li> <li>(c) Recommended spare parts shall be quoted separately (Schedules of Prices: Part 2) as specified in subparagraph (b) above in accordance with the origin of the spare parts.</li> </ul> |
|  | 15.4 | The term CFR shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, Paris.  |
|  | 15.5 | Prices quoted by the tenderer shall be on a fixed lump sum basis and shall not be adjusted for changes in the cost of labor, material or other matters except only for changes in legislation in accordance to Sub-Clause 13.16 of the General Conditions of Contract.  |
| <b>16. Bid Currencies</b>                  | 16.1 | Prices shall be quoted in the following currencies: <ul style="list-style-type: none"> <li>(a) The prices shall be quoted in the Fijian currency and either in <b>US/NZ/AU Dollars and EURO</b>.</li> <li>(b) a tenderer expecting to incur a portion of its expenditures in the performance of the Contract in more than one currency, and wishing to be paid accordingly, shall so indicate in its Bid; and.</li> </ul>   |
|  | 16.2 | Tenderers shall be FIXED LUMP SUM, and not subject to any exchange fluctuations.  |

- 16.3 Tenderers may be required by the Employer to clarify their local and foreign currency requirements, and to substantiate that the amounts included in the Schedule of Prices and shown in the Appendix to tender are reasonable and responsive to Sub-Clause 15.1 in which case a detailed breakdown of its foreign currency requirements shall be provided by the bidder.

#### 17. Tender Validity

- 17.1 Tenders shall remain valid for a period of **120 days** after the date of opening of proposals specified in Sub-Clause 24.1.
- 17.2 In exceptional circumstances, prior to expiry of the original tender validity period, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing or by email.

#### 18. Alternative Proposals by Tenderers

- 18.1 Tenderers wishing to offer technical alternatives to the Employer's Requirements of the tender documents must first price the Employer's Requirements as described in the tender documents and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methods. Only the technical alternatives, if any, of the lowest evaluated bidder conforming to the basic technical requirements shall be considered by the Employer.

#### 19. Format and Signing of Tender

- 19.1 The bidder shall prepare one original and 1 copy of the tender proposal, clearly marking each one as: "ORIGINAL-TENDER PROPOSAL", "COPY NO. 1 – TENDER PROPOSAL", etc as appropriate. In the event of discrepancy between the original and any copy, the original shall prevail.
- 19.2 The original and all copies of the tender shall be typed or written in indelible ink (in the case of copies, Photostats are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of the bidder, pursuant to Sub-Clauses 5.1 (a) or 5.2 (b), as the case may be. All pages of the tender where entries or amendments have been made shall be initialed by the person or persons signing the tender.
- 19.3 The tenderer shall provide one softcopy of the Tender Proposal in addition to sub-clause 19.1.
- 19.4 The tender shall contain no alterations, omissions or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person or persons signing the bid.
- 19.5 The tenderer shall furnish information as described in the Form of Tender on commission or gratuities, if any, paid or to be paid relating to this Tender, and to Contract execution if the bidder is awarded the Contract.

#### 20. Sealing and Marking of Tenders

Bidders are requested to upload electronic copies via Tender Link by registering their interest at:  
<https://www.tenderlink.com/efl>

**EFL will not accept any hard copy submission to be dropped in the tender box at EFL Head Office in Suva.**

**This tender closes at 4.00pm (1600hrs Fiji Time) on Wednesday 17<sup>th</sup> July, 2024.**

For further information or clarification please contact our Supply Chain Office on phone (+679) 3224360 or (+679) 9992400 or email us on [tenders@efl.com.fj](mailto:tenders@efl.com.fj)

The bidders must ensure that their bid is inclusive of all Taxes payable under Fiji Income Tax Act. Bidders are to clearly state the percentage of VAT that is applicable to the bid prices.

The lowest bid will not necessarily be accepted as the successful bid.

The Tender Bids particularly the "Price" must be typed and not hand written.

**Any request for the extension of the closing date must be addressed to EFL in writing three (3) working days prior to the tender closing date.**

**Tender Submission via email or fax will not be accepted.**

- 21. Deadline for Submission of Tenders**
- 21.1 **Tenders must be received by the Employer at the address specified above no later than 1600 hours (Fiji Time) Wednesday 17<sup>th</sup> July, 2024.**
- 21.2 The Employer may, at its discretion, extend the deadline for submission of tenders by issuing an addendum in accordance with Clause 11, in which case all rights and obligations of the Employer and the tenderers previously Subject to the original deadline will thereafter be subject to the deadlines extended.
- 22. Late Submissions**
- 22.1 Any tender received by the Employer after the deadline for submission of tenders prescribed in Clause 23 will be rejected.
- 23. Modification and Withdrawal of Tender**
- 23.1 The tenderer may modify or withdraw its bid after tender submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.
- 23.3 No tender may be modified by the tenderer after the deadline for submission of bids, except in accordance with Sub-Clauses 23 and 28.2.
- 24. Opening of Tenders**
- 24.1 The Employer will open the bids, including modifications made pursuant to Clause 23, at the earliest suitable date and time after closing of the bids, at the following location:  
*Energy Fiji Limited  
 2 Marlow st,  
 Suva  
 Fiji*
- 25.1 Information relating to the examination, clarification, evaluation and comparison of tenders and recommendations for the award of a contract shall not be disclosed to tenderers or any other persons not officially concerned with such process. Any effort by a tenderer to influence the Employer's processing of tender or award decisions may result in the rejection of the tenderers bid.
- 25. Process to Be Confidential**
- 26.1 To assist in the examination, evaluation and comparison of tenders, the Employer may, at its discretion, ask any tenderer for clarification of its tender. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the tender shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in, accordance with Clause 28.
- 26. Clarification of Tender and Contacting the Employer**
- 26.2 Subject to Sub-clause 28.1, no tenderer shall contact the Employer on any matter relating to its tender from the time of the tender opening to the time the Contract is awarded. If the tenderer wishes to bring additional information to the notice of the Employer, it should do so in writing.
- 26.3 Any effort by the tenderer to influence the Employer in the Employer's tender evaluation, tender comparison or Contract award decisions may result in the rejection of the tenderers bid.
- 27.1 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender (i) meets the eligibility criteria; (ii) has been properly signed; (iii) is accompanied by the required securities; (iv) is substantially responsive to the requirements of the tender documents; (v) is conforming to Clause 13; and (vi) provides any clarification and/or substantiation that the Employer may require pursuant to Clause 26.
- 27. Preliminary Examination of Tender and Determination of Responsiveness**
- 27.2 A substantially responsive tender is one which conforms to all the terms, conditions and requirements of the tender documents, without material deviation or reservation. A material deviation or reservation is one (i) which affects in any substantial way the scope, quality or performance of the Works; (ii) which limits in any substantial way, inconsistent with the tender documents, the Employer's rights or the tenderers obligations under the Contract; or (iii) whose

Rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive bids.

27.3 If a tender is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made Responsive by correction or withdrawal of the nonconforming deviation or reservation.

## 28. Correction of Errors

28.1 Tenders determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Arithmetic errors will be rectified on the following basis. If there is a discrepancy between the unit rate and the total cost that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total cost will be corrected unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit rate, in which case the total cost as quoted will govern and the unit rate corrected. If there is a discrepancy between the total bid amount and the sum of total costs, the sum of the total costs shall prevail and the total bid amount will be corrected.

28.2 The amount stated in the Form of Tender will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of tender, its bid will be rejected.

## 29. Conversion to Single Currency

29.1 The Employer will convert the amounts in various currencies in which the Tender Price is payable to the currency of the Employer's country at the selling exchange rates officially prescribed for similar transactions as established by the Reserve Bank of Fiji on the date of opening of tenders.

## 30. Evaluation and Comparison of Tender

30.1 The Employer will evaluate and compare only the tenders determined to be substantially responsive in accordance with Clause 27.

30.2 For plant and equipment, the comparison shall be of the CFR to Site price of plant and equipment offered. The Employer's comparison will also include the costs resulting from application of the evaluation procedures described in Sub-Clause 30.4.

30.3 The Employer will carry out a detailed evaluation of the tenders in order to determine whether the tenders confirm to meet the prequalification requirements and whether the tenders are substantially responsive to the requirements set forth in the tender documents.

30.4 Pursuant to Sub-Clause 30.3, the following evaluation methods will be followed:

(a) **Contractual and commercial deviations:** The evaluation shall be based on the evaluated cost for fulfilling the Contract in compliance with all commercial, contractual and technical obligations under this tender document. The Employer will make its own assessment of the cost of any deviations for the purpose of ensuring fair comparison.

(b) **Time Schedule:** The plant and equipment covered by this tender are required to be shipped, installed, tested and commissioned and all other associated works completed within the period specified in Sub-Clause 1.2 and the Appendix to the Tender.

Tenderers submitting bids which deviate from the time schedule specified will be rejected.

(c) The price of recommended spare parts quoted in Schedule of Prices shall not be considered for evaluation.

(d) **Functional Guarantee of the facilities:**

(i) Tenderers shall state the functional guarantees (e.g. performance, efficiency, consumption) of the proposed facilities in response to the Employer's Requirements. Plant and equipment offered shall have a minimum (or a maximum, as the case may be) level of functional guarantees specified in the Employer's Requirements to be considered responsive. Bids offering plant and equipment with functional guarantees less (or more) than the minimum (or maximum) specified shall be rejected.

(e) **Work, services, facilities etc., to be provided by the Employer:** Where tender include for the undertaking of work or the provision of services or facilities by the Employer in excess of the provisions allowed for in the tender documents, the Employer shall assess the costs of such additional work, services and/or facilities during the duration of the Contract. Such costs shall be added to the tender price for evaluation.

30.5 (a) Any adjustments in price which result from the above procedures shall be added, for purposes of Comparative evaluation only, to arrive at an "Evaluated Tender Price". Tender prices quoted by Tenderers shall remain unaltered.

(b) The Employer reserves the right to accept or reject any variation, deviation or alternative offer. Variations, deviations, and other factors which are in excess of the requirements of the tender documents or otherwise

result in the accrual of unsolicited benefits to the Employer shall not be taken into account in tender evaluation.

- (c) The estimated effect of the price adjustment provisions of the Conditions of Particular Application, applied over the period or execution of the Contract, shall not be taken into account in tender evaluation.
- (d) If the tender of the successful tenderer is substantially below the Employer's estimate for the Contract, the employer may require the tenderer to produce detailed price analyses to demonstrate the internal consistency of those prices. After evaluation of the price analysis, the Employer may require that the amount of the performance security set forth in Clause 38 be increased at the expense of the successful tenderer to a level sufficient to protect the Employer against financial loss in the event of default of the successful tenderer under the Contract.

- 31.1 No preference shall be given for domestic contractor or joint venture partners.
- 31. Domestic Preference**
- 32. Award**
  - 32.1 Subject to Clause 33, the Employer will award the Contract to the tenderer whose bid has been determined to be substantially responsive to the tender documents and who has offered the Best Value for Money, provided that such tenderer has been determined to be (i) eligible in accordance with the provisions of Clause 3; and (ii) qualified in accordance with the provisions of Clause 5.
  - 32.2 The tenderer may be required to attend meetings at the Employer's office for techno-commercial discussions prior to the signing of the Contract at no cost to the Employer.
- 33. Employer's Right to Accept any tender and to Reject any or all Tenders**
  - 33.1 Notwithstanding Clause 32, the Employer reserves the right to accept or reject any tender, and to annul the tender process and reject all tenders, at any time prior to award of Contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the Employer's action.
- 34. Notification of Award**
  - 34.1 Prior to expiration of the period of tender validity prescribed by the Employer, the Employer will notify the successful tenderer by fax, confirmed by registered letter, that its tender has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall name the sum which the Employer will pay the Contractor in consideration of the execution, completion and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Contract Price").
  - 34.2 The notification of award will constitute the formation of the Contract.
  - 34.3 Upon the furnishing by the successful tenderer of a performance security, the Employer will promptly notify the other tenderer that their tenders have been unsuccessful
- 35. Signing of Contract Agreement**
  - 35.1 At the same time that he notifies the successful tenderer that its tender has been accepted, the Employer will send the tender the Form of Contract Agreement provided in the tender documents, incorporating all agreements between the parties.
  - 35.2 Within 60 days of receipt of the Form of Agreement, the successful tenderer shall sign the Form and return it to the Employer.
- 36. Performance Security**
  - 36.1 Within 28 days of receipt of the notification of award from the Employer, the successful tenderer shall furnish to the Employer a performance security in an amount of 10 percent of the Contract Price in accordance with the Conditions of Contract. The form of performance security provided in Section 6 of the bidding documents shall be used.
  - 36.2 Failure of the successful tenderer to comply with the requirements of Clauses 35 or 36 shall constitute sufficient grounds for the annulment of the award.
- 37. Corrupt or Fraudulent Practices**
  - 39.1 The Employer requires that the Contractor observe the highest standard of ethics during the procurement and execution of such contracts. In Pursuance of this policy, the Employer:
    - (a) defines, for the purposes of this provision, the terms set forth below as follows:
      - (i) "corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and
      - (ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open

Competition;

- (b) will reject a proposal for award if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

37.2 Furthermore, tenderers shall be aware of the provision stated in Sub-Clause 1.16 and Sub-Clause 15.5 of Section 3 - Conditions of Particular Application.

## SECTION 2 – GENERAL CONDITIONS OF CONTRACT

# **FIDIC**

## **CONDITIONS OF CONTRACT FOR DESIGN-BUILD & TURNKEY**

First Edition, 1995

A Publication of the International Federation of Consulting Engineers

### ***Notes on the Conditions of Contract***

The Conditions of Contract comprise two parts: Part I – General Conditions (Section 2 of this document), and Part II – Conditions of Particular Application (Section 3 of this document).

The International Federation of Consulting Engineers (FIDIC), has recently prepared the First Edition (1995) of Conditions of Contract for Design-Build and Turnkey Contracts. FIDIC Part I – General Conditions is included herein, complete and without any changes as Section 2 of these documents.

Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat  
P.O. Box 86  
1000 Lausanne 12  
Switzerland  
Facsimile: 41 21 653 5432  
Telephone: 41 21 653 5003

## SECTION 3 – CONDITIONS OF PARTICULAR APPLICATION

- Sub-Clause 1.1  
Definitions** Amend sub para 1.1.1.3 of Sub-Clause 1.1 by adding the following words at the end:
- "The word „tender” is synonymous with bid”."
- Add the following subparagraph to Sub-Clause 1.1:
- "1.1.2.7 "EFL" means the Energy Fiji Limited."
- Sub-Clause 1.4  
Law and  
Language** Replace the text of Sub-Clause 1.4 and add the following:
- "The Contract shall be governed by and construed in accordance with the Laws of Fiji.  
The language is the English language."
- Sub-Clause 1.5  
Contract  
Agreement** Substitute the wordings in Part I with the following:
- "A Contract Agreement in the form annexed, with such modifications as may be necessary to record the agreement reached shall be executed. The costs of stamp duties and similar charges imposed by the law shall be borne by the Employer."
- Sub-Clause 1.6  
Priority of  
Documents** Replace the list of documents listed under (a) to (h) and add the following:
- "(a) the Contract Agreement;  
(b) the Letter of Acceptance;  
(c) the Employer's Requirements;  
(d) the Tender;  
(e) the Conditions of Contract, Part II;  
(f) the Conditions of Contract, Part I;  
(g) the Schedules;  
(h) the Drawings;  
(i) the Contractor's Proposal; and  
(j) The Correspondences During Tender Evaluation."
- Sub-Clause 1.15  
Confidentiality** Additional sub-clause:
- "The Contractor shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out its Obligations under it. The Contractor shall not publish, permit to be published or disclose any particulars of the Contract in any Trade or technical paper or elsewhere without the prior consent in writing of the Employer."
- Sub Clause 2.5  
Customs and  
Import Duties**
- (a) The Employer shall pay for all Fiji customs and import duties including clearing, handling charges, port dues and demurrage except only for customs and import duties in respect of tools required for installation, testing and Commissioning, which shall be the responsibility of the Contractor.
- (b) Customs and import duties if any in respect of the Contractor's Equipment shall not be borne by the Employer.
- Sub-Clause 3.1  
Employer  
Representative's  
Duties and  
Authority** Add the following clause as required:
- "The Employer's Representative shall obtain the specific approval of the Employer before taking action under the following clauses of the Conditions of Contract Part I.
- (a) Approving sub-contracting of any part of the Works under Sub-Clause 4.5.  
(b) Certifying additional cost to the Contract Price.  
(c) granting an extension of time for completion under Sub-Clause 8.3.  
(d) suspending progress of part or all of the Works under Sub-Clause 8.8.  
(e) issuing a variation under Clause 14, except if such a variation would increase the Contract Price by no more than FJD 5,000.  
(f) issuing Taking-Over Certificate for the whole of the Works under Sub-Clause 10.1.  
(g) issuing Performance Certificate for the Works under Sub-Clause 12.9.

Notwithstanding the obligation to obtain approval as set out above, if in the opinion of the Employer's Representative, an emergency occurs affecting the safety of life or of the Works or of adjoining property, it may, without relieving the Contractor of any of its duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Employer's Representative be necessary to abate or reduce the risk. The Contractor shall forthwith comply with the instructions of the Employer's Representative despite the absence of approval of the Employer. The Employer's Representative shall determine the extra cost to the Contractor for carrying out of such instruction and obtain the Employer's approval for an addition to the Contract Price."



|   |  |
|---|--|
| <b>Sub-Clause 4.1<br/>General<br/>Obligations</b>                       | Add the following sentence to precede the existing text under Sub-Clause 4.1:<br><br>"Notwithstanding any other provision to the contrary, the Contractor is required to check the design criteria and calculations (if any) included in the Employer's Requirements, to confirm their correctness, in its bid and to assume full responsibility for them."  |
| <b>Sub-Clause 4.2<br/>Performance<br/>Security</b>                      | Replace the first paragraph of Sub-Clause 4.2 with the following:<br><br>"The Contractor shall provide security for its proper performance of the Contract to the Employer within 28 days after the receipt of the Letter of Acceptance. The performance security shall be in the form of a bank guarantee, issued either (a) by a bank located in the country of the Employer or a foreign bank through a correspondent bank located in the country of the Employer, or (b) Directly by a foreign bank acceptable to the Employer. The performance security shall be denominated in the types and proportions of currencies in which the Contract Price is payable. When providing such security to the Employer, the Contractor shall notify the Employer's Representative of so doing."   |
| <b>Sub-Clause 4.3<br/>Contractors<br/>Representative</b>                | At the end of Sub-Clause 4.3 add:<br><br>"The Contractor's Representative must be fluent (both spoken and written) in the English language."   |
| <b>Sub-Clause 4.4<br/>Co-ordination<br/>Of the Works</b>                | Modify the first sentence of Sub-Clause 4.4 to read:<br><br>"The Contractor shall be responsible for the co-ordination and proper execution of the Works, including co-ordination with other contractors and organizations to the extent specified in the Employer's Requirements."  |
| <b>Sub-Clause 4.9<br/>Site Data</b>                                     | Modify the last sentence of paragraph 1 of Sub-Clause 4.9 to read:<br><br>"The Contractor shall be responsible for interpreting all data including data listed elsewhere in the Contract as open for inspection at EFL, Navutu Depot, Lautoka, Fiji".  |
| <b>Sub-Clause 4.14<br/>Programme</b>                                    | Delete the third sentence of Sub-Clause 4.14 indicated below:<br><br>"Unless otherwise stated ..... and late finish dates".  |
| <b>Sub-Clause 5.2<br/>Construction<br/>Documents</b>                    | In the fifth line of the second paragraph of sub-clause 5.2 replace "21" with "28".<br><br>In Sub-Clause 5.2 delete sub-paragraph (a) and substitute:<br><br>"(a) Construction shall not commence until the Contractor receives from the Employer's Representative approval of the Construction Documents relevant to the design and construction of such parts; provided always that:<br>(i) if the Employer's Representative fails to give his ruling within 21 days, the Contractor shall give written notice (for the purpose of this sub-clause "Contractor's Notice") to the Employer's Representative of such failure; and<br>(ii) if the Employer's Representative fails to give his ruling within 7 days of receipt of the Contractor's Notice, then the Contractor may proceed with the construction as though approval had been given". |
| <b>Sub-Clause 5.4<br/>Technical<br/>Standards<br/>&amp; Regulations</b> | Add the following sentence to the end of the Sub-Clause 5.4:<br><br>"In respect of technical specifications and standards, IEC (International Electrotechnical Commission based in 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, and Switzerland) standards are to be adopted in general. Any national or international standards which promise to confer equal or better quality than the standards specified will also be acceptable. In all instances a copy of the relevant standards should be forwarded to the Employer's Representative".   |
| <b>Sub-Clause 6.7<br/>Health and<br/>Safety</b>                         | To sub-clause 6.7 add the following paragraph:<br>The Contractor must, at all times during the execution of the Work, comply with the Health and Safety at Work Act 1996, the Electricity Act Cap 180, the Energy Fiji Limited "Safety Manual" – Safety Rules and First aid For Employees Of the Authority.  |
| <b>Sub-Clause 6.8<br/>Contractor's<br/>Superintendence</b>              | At the end of Sub-Clause 6.8 add:<br><br>"All the Contractors superintending staff shall have a working knowledge of the English language."  |
| <b>Sub-Clause 6.11<br/>Foreign staff<br/>and Labour</b>                 | "The Contractor may import such staff, and laborers as are required in order to execute the Works. The Contractor must ensure that all such staff and labour are provided with the required visas and work permits. The Contractor shall be responsible for the return to the place where they were recruited or to their domicile of all persons whom the Contractor recruited and employed for the purpose of or in connection with the Contract. The Contractor shall be responsible for such persons as are to be returned until they shall have left the Site or, in the case of foreign nationals who have been recruited outside the Country, shall have left it."  |
| <b>Sub-Clause 6.12<br/>Measures</b>                                     | "The Contractor shall at all times take the necessary precautions to protect all staff and labour employed on the Site from insect and pest nuisance, and to reduce the dangers to health and the general nuisance occasioned by the same. The Contractor shall  |

|  |  |
|--|--|
| <b>against Insect &amp; Pest Nuisance</b>              | provide its staff and labour with suitable prophylactics for the prevention of malaria and dengue fever and take steps to prevent the formation of stagnant pools of water. The Contractor shall comply with all the regulations of the local health authorities and shall arrange to spray thoroughly with approved insecticide all buildings erected on the Site. Such treatment shall be carried out at least once a year or as instructed by such authorities."  |
| <b>Sub-Clause 6.13 Epidemics</b>                       | "In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government or the local medical or sanitary authorities, for the purpose of dealing and overcoming the same."   |
| <b>Sub-Clause 6.14 Alcoholic Liquors or Drug</b>       | "The Contractor shall not import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents staff or labour."   |
| <b>Sub-Clause 6.15 Arms and Ammunition</b>             | "The Contractor shall not give, barter or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer to the same as aforesaid."   |
| <b>Sub-Clause 6.16 Burial of the Dead</b>              | The Contractor shall make all necessary arrangements for the transport, to any place as required for burial, of any of his expatriate employees or members of their families who may die in the Country.<br>The Contractor shall also be responsible, to the extent required by local regulations, for making any arrangements with regard to burial of any of his local employees who may die while engaged upon the Works.   |
| <b>Sub-Clause 6.17 Festivals and Religious Customs</b> | "The Contractor shall in all dealings with his staff and labour have due regard to all recognized festivals, days of rest and religious or other customs."   |
| <b>Sub-Clause 7.3 Inspection</b>                       | To sub – clause 7.3 add the following paragraphs:<br><br>The Employer and the Contractor shall carry out a joint walk through inspection to identify and document any defects/ deficiencies of the Works prior to commissioning, after which the Contractor shall rectify all the identified defects.<br><br>The Employer and the Employer's Representative shall be entitled at any time during the term of this Contract to inspect any part of the Works and the Contractor shall give them full opportunity and access to conduct such inspection.   |
| <b>Sub-Clause 7.7 Restriction on Eligibility</b>       | (a) Any materials, equipment, services or design services which will be incorporated in or required for the Contract, as well as the Contractor's Equipment and other supplies, shall have their origin from reputable source countries acceptable to the Employer.<br>(b) For the purpose of this clause, "services" means the works and all project-related services including design services.<br>(c) For the purposes of this clause, "origin" means the place where the materials and equipment were mined, grown, produced, or manufactured, or from which the services are provided.<br>(d) The origin of Goods and Services is distinct from the nationality of the Supplier." |
| <b>Sub-Clause 12.11 Warranty</b>                       | "The Employer shall be entitled to all applicable manufacturers' warranties for the Plant and equipment supplied by the Contractor. The Contractor warrants the Equipment to be free from defects in workmanship and material used in their manufacture and Installation. This warranty will cover Equipment for claims for such defects and workmanship made during the Warranty Period, being 42 months from completion of defects liability period and issuing of performance certificate   |
| <b>Sub-Clause 13.2 Advance Payment</b>                 | Modify the third sentence of this Sub-Clause to read:<br><br>"The Employer's Representative shall issue an Interim Payment Certificate for the first instalment after (i) execution of the Contract Agreement by the parties hereto (ii) provision of the Performance Security in accordance with Sub-Clause 4.2 by the Contractor and (iii) provision of an unconditional bank guarantee by the Contractor in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment."  |
| <b>Sub-Clause 13.4 Schedule of Payments</b>            | To Sub-Clause 13.4 add:<br><br>The payments will be made according to the following schedule:<br><br>a) Twenty Percent (20%) upon completion of design review<br>b) Twenty Percent (20%) payment upon completion of Factory Acceptance Testing and sign off by both parties.<br>c) Ten percent (10%) upon shipment supported by bill of lading.<br>d) Ten percent (10%) upon delivery of equipment to site.<br>e) Twenty Percent (30%) upon commissioning and issuing of performance certificate<br>f) Five Percent (10%) retention, 12 months after issuing of performance certificate<br>Or agreed in the contract otherwise.  |
| <b>Sub-Clause 13.15 Calculation of</b>                 | Delete Clause 13.15 and add the following:   |

**Payments in Foreign Currency**

"The Contract shall be paid in the currencies stated in the Appendix to Tender and shall be in accordance with Schedule of Prices and Conditions of Payment.

The foreign and local currency portions of the balance of the Contract Price shall be amended by agreement between the Employer and the Contractor to reflect any substantial changes in the expected foreign and local currency requirements of the Contractor during the execution of the Works, provided:

- (a) the Contractor shall inform the Employer and the Employer's Representative whenever any such substantial change may occur;
- (b) The Employer's Representative may recommend a review of such expected requirements if in its judgment there is evidence of a change in the country of origin of equipment, materials, plants, or services to be provided under the Contract which should result in any substantial change of such expected requirements.

Any such amendment shall be affected by comparing the amounts quoted in the bid with the amounts already used in the Works and the Contractor's future needs for imported items."

**Sub-Clause 13.15  
Calculation of Payments in Foreign Currency  
Sub-Clause 13.17  
Taxation**

To sub-clause 13.15 add the following paragraph:

The local (Fijian) component of the Contract Price shall not be subjected to any currency exchange rate variation.

- "(i) The prices bid by the Contractor shall include all taxes, duties and other charges imposed outside the Employer's country on the production, manufacture, sale and transport of the Contractor's equipment, Plant, materials and supplies to be used on or furnished under the Contract, and on the services performance under the Contract.

**Sub-Clause 15.5  
Corrupt or Fraudulent Practices**

Delete the existing Sub-Clause 15.5 and substitute the following:

"If in the judgment of the Employer the Contractor has engaged in corrupt or fraudulent practices, in competing for or in executing the Contract, then the Employer may, after having given 14 days' notice to the Contractor, terminate the Contractor's employment under the Contract and expel the Contractor from the Site, and the provisions of Clause 15 shall apply as if such expulsion had Been made under Sub-Clause 15.2."

**Sub-Clause 17.3  
Employer's Risks**

This sub-clause is amended to read as follows:

"The Employer's risks are:

- (a) insofar as they directly affect the execution of the Works in the country where the Permanent Works are to be executed:
  - (i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies in the Country;
  - (ii) rebellion, revolution, insurrection, or military or usurped power, or civil war in the Country;
  - (iii) ionizing radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or hazardous properties of any explosive nuclear assembly or nuclear component thereof in the Country;
  - (iv) pressure waves caused by aircraft or other aerial devised travelling at sonic or supersonic speeds in the Country;
  - (v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of its Subcontractors and arising from the conduct of the Works in the Country;
- (b) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract;
- (c) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced Contractor:
  - (i) could not have reasonably foreseen, or
  - (ii) could reasonably have foreseen, but against which he could not reasonably have taken appropriate measures to Prevent loss or damage to physical property occurring."

**Sub-Clause 18.2  
Insurance for Works and Contractor's Equipment**

- (a) Amend the second sentence of the first and second paragraphs to read:

"This insurance shall cover loss or damage from any cause other than the Employer's risks listed in amended Sub-Clause 17.3 paras. (a)(i) to (iv) in Part II of the Conditions of Contracts".

- (b) Amend the fourth sentence of the first paragraph to read:

"Such insurance shall cover the Employer and the Contractor from the first working day after the Commencement Date until the date of issue of the Taking-Over Certificate for the Works."

## SECTION 4 – GENERAL SPECIFICATIONS

### 4.1 BACKGROUND

The largest generating station operated by EFL is the Wailoa Hydro Power station (80MW), situated in the center of the main island, Viti Levu. It is linked to the major load centers by two 132kV Steel lattice tower single circuit transmission lines. The East coast transmission is to Cunningham Rd 132/33kV substation in Suva (Capital) and the West coast supply is to the 132/33kV substation in Vuda (near Lautoka). The Wainikasou Hydro Power Station (6MW) is connected at the Wailoa 132kV Switching Station via 132kV/33kV Transformer (T5).

The 132kV Circuit Breaker for the 132kV/33kV Transformer (T5) is reaching its end of life. Hence, this tender is for the Turnkey Design Build, manufacture, supply, installation, testing and commissioning of:

1. One unit (1) of gang pole 3 phase 145kV rated SF6 circuit breaker to be installed at HV side of 132/33kV Transformer T5.
2. Supply of associated accessories.
3. Control wiring works
4. Supply of spares as per EFL list provided and manufactures recommended spares.
5. Supply one unit (1) of single pole 3 phase 145kV SF6 Circuit Breaker with support structures as spare for EFL's 132kV Transmission circuits.
6. Provide comprehensive training on the installation, testing, commission and operation and maintenance.

### 4.2 EXTENT OF WORK

This Contract is suitable for Switchgear Manufacturers and their recommended contracting arms & includes the design, manufacture, inspecting and testing, packing for export, shipment to site, complete erection, site testing, training and commissioning of the Plant described herein.

The Contractor shall be responsible for making good for any defective material design or workmanship for a period of twelve months after taking over. The Contractor is to co-operate with other contractors and EFL operating staff as may be necessary.

Works must fully interact with each other in every respect. Additionally, they must properly interact with any other Contractors work as far as an interfacing is specified or mentioned herein.

In case the Contractor finds any parts of these Specifications incomplete, contradictory or defective, he shall be responsible to immediately bring this to the notice of the Employer and make a proposal for the Employer's approval, for making good such incompleteness or defect at the stage of bidding. No additional cost to the Employer shall arise out of such rectification.

Main design data given in these Specifications and general layouts of the substations are available in the Drawings.

### 4.3 ASSOCIATED PLANT DETAILS

The given particulars elsewhere in this document are those anticipated for plant being provided under other Contracts or already existing and should be used in the preparation of the Bid. They are, however, subject to confirmation and where they are considered to have an effect on the final design of equipment being provided under this Contract, the Contractor is to obtain figures from the Engineer before proceeding with designs.

### 4.4 ELECTRICAL DESIGN CRITERIA

#### 4.3.1 System Conditions

System Particulars for 132kV & 33kV system applicable in Fiji Islands are stated in the table below:

|                                       | <b>132kV</b>     | <b>33 kV</b>                         |
|---------------------------------------|------------------|--------------------------------------|
| <b>Normal system voltage</b>          | 132kV            | 33 kV                                |
| <b>System Highest voltage</b>         | 145kV            | 36 kV                                |
| <b>Frequency</b>                      | 50Hz             | 50 Hz                                |
| <b>Earthing of Neutral point</b>      | Directly Earthed | Earthed through earthing Transformer |
| <b>Design Symmetrical fault level</b> | 40kA             | 25kA                                 |

### 4.3.2 Service Conditions

The Service Conditions applicable in Fiji Islands, at the location of substation site are given below:

|  |  |
|--|--|
| Daily average ambient temperature              | 30°C   |
| Max ambient temperature                        | 40°C   |
| Annual average ambient temperature             | 30°C   |
| Minimum ambient temperature                    | 10 °C  |
| Relative Humidity                              | 90%  |
| Altitude                                       | 500m   |
| Maximum Wind Speed (under cyclonic conditions) | 100m/sec - gusting (under cyclonic conditions) |
| Isokeraunic Level                              | 50   |
| Seismic Level                                  | 7 on the open ended Richter scale              |
| Average Rainfall per year                      | 2663mm   |

**Note:** Fiji is situated in a region where cyclones are experienced frequently. All plant and equipment shall be designed and constructed to withstand these extreme conditions.

All plant and equipment shall be rust proof, vermin proof and weather proof and designed to be suitable for a damp, tropical climate, which may be experienced simultaneously.

### 4.3.3 Power supply for electrical operation

|  |            |          |
|--|------------|----------|
| 1.0 Control /alarm /emergency              | DC Voltage | 110 V    |
| 2.0 Supply voltage of auxiliary equipment  | AC Voltage | 415/240V |
| 3.0 Supply voltage for auxiliary equipment | DC Voltage | 110V     |

### 4.3.4 Minimum Substation Clearances

The electrical clearances of all the circuit breaker live components and connections shall be as prescribed in IEC 60071-2, or 1300mm (650kV BIL), whichever is higher. The minimum approach distance to the live part of any high voltage equipment at 132kV is 2200mm as per EFL Safety standards.

### 4.3.5 Pollution levels of Insulators and Bushings

Minimum creepage distance per unit – 55mm/kV (phase to ground as per IEC 60815)

### 4.3.6 Insulation Co-ordination

The design of plant and equipment shall be such that insulation co-ordination is provided not only between different items of plant such as transmission line, surge arrestors, transformers, circuit breakers, but also between different components of items within a particular item of equipment.

### 4.3.7 Inter-Changeability

Corresponding items or parts shall be interchangeable as far as possible.

### 4.3.8 Maintainability

All plant and equipment supplied under this contract shall be maintainable. The contractor in adequate number of copies shall provide all necessary tools and equipment and operations and maintenance manuals required for this purpose. All special tools shall be supplied by the Contractor in 2 sets.

### 4.3.9 Ventilation

Kiosks, cubicles and similar enclosed compartments shall be adequately ventilated to restrict condensation. All contactors, relay coils, etc. Shall be suitably protected against corrosion and fully tropicalized.

### 4.3.10 Risk of Fire

All apparatus, connections and cabling shall be designed and arranged to minimize the risk of fire and any damage, which might be caused in the event of fire.

## 4.5 QUALITY OF MATERIALS AND WORKMANSHIP

All materials used under this contract shall be new and of the quality and class most suitable for working under the conditions specified and shall withstand the variations of temperature, atmospheric conditions arising under working conditions without distortion or deterioration or the setting up of undue stresses in any part and also without affecting the strength and suitability of the various parts of the work which they have to perform.

All work shall be carried out and completed in a neat and professional manner to the approval of the Employer's Representative.

## 4.4 STANDARDS

IEC Standards are to be adopted in general. British, Australian or American standards too may be applied wherever necessary. Any other national or international standard may be used if such standards are not less exacting than corresponding IEC Standard subject to the Employer's approval. In all instances a copy of the relevant standard adopted should be forwarded to the Engineer.

The Works shall be constructed in accordance with the laws of Fiji and associated Acts and Regulations. These include:

The Electricity Act – 2017  
Health and Safety at Work Act – 1996  
Environment Management Act

In order to achieve Regulatory compliance under the Fiji Electricity Act, the Works shall comply with the Electricity Regulations and AS/NZS 3000:2007 "Wiring Rules".

In the absence of specific standards being nominated in the specifications, the following standards shall apply:

### Australian/New Zealand Standards

|        |          |  |
|--------|----------|--|
| AS     | 1154     | Insulator and conductor fittings for overhead power lines  |
| AS/NZS | 1170     | Structural Design Actions  |
| AS/NZS | 1559     | Hot-dip galvanized steel bolts with associated nuts and washers for tower construction   |
| AS/NZS | 1768     | Lightning Protection   |
| AS     | 1824     | Insulation coordination – Definitions, principles and rules  |
| AS     | 1940     | The storage and handling of flammable and combustible liquids  |
| AS     | 2067     | Switchgear Assemblies and Ancillary Equipment for Alternating Voltages above 1kV   |
| AS/NZS | 2312     |  |
| AS/NZS | 2373     | Electric cables – Twisted pair for control and protection circuits   |
| AS/NZS | 2650     | Common specifications for high-voltage switchgear and controlgear standards  |
| AS/NZS | 3000     | Wiring Rules   |
| AS/NZS | 3008.1.1 | Electrical installations – Selection of cables – Cables for alternating voltages up to and including 0.6/1 (1.2) kV.   |
| AS/NZS | 3010     | Electrical Installations – Generating Sets   |
| AS     | 3011.2   | Electrical installations – Secondary batteries installed in buildings, Part 2: Sealed cells  |
| AS/NZS | 3080     | Telecommunications installations - Generic cabling for commercial premises   |
| AS/NZS | 3155     | Approval and test specification - Electric cables - Neutral screened - For working voltages up to and including 0.6/1 kV   |
| AS/NZS | 3191     | Electric flexible cords  |
| AS/NZS | 3439.1   | Low voltage switchgear and control gear assemblies   |
| AS/NZS | 3439.2   | Low-voltage switchgear and controlgear assemblies - Particular requirements for busbar trunking systems (busways)  |
| AS     | 3607     | Conductors-Bare overhead, aluminium and aluminium alloy – steel reinforced   |
| AS/NZS | 3835     | Earth potential rise - Protection of telecommunications network users, personnel and plant   |
| AS/NZS | 3947     | Low voltage switchgear and control gear, (all relevant parts)  |
| AS     | 4024.1   | Safety of machinery, (all relevant parts)  |
| AS/NZS | 4026     | Electric cables - For underground residential distribution systems   |
| AS/NZS | 60265.1  | High-voltage switches - Switches for rated voltages above 1 kV and less than 52 kV   |
| AS     | 60265.2  | High-voltage switches - High-voltage switches for rated voltages of 52 kV and above  |
| AS     | 60529    | Degrees of protection provided by enclosures (IP Code)   |
| AS     | 60870    | Telecontrol equipment and systems (All parts)  |
| AS/NZS | 60898    | Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Circuit-breakers for a.c. operation                             |
| AS     | HB101    | Coordination of power and telecommunications - Low Frequency Induction (LFI): Code of practice for the mitigation of hazardous voltages induced into telecommunications lines. |

### International Electrotechnical Commission (IEC)

|     |       |  |
|-----|-------|--|
| IEC | 11801 | Information technology – Generic cabling for customer premises                     |
| IEC | 14763 | Information technology – Implementation and operation of customer premises cabling |

|     |               |  |
|-----|---------------|--|
| IEC | 24702         | Information technology – Generic cabling – Industrial premises   |
| IEC | 60034         | Rotating Electrical Machines – all relevant parts  |
| IEC | 60038         | IEC Standard Voltages  |
| IEC | 60041         | Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines                             |
| IEC | 60044         | Instrument Transformers  |
| IEC | 60051         | Direct acting indicating analogue electrical measuring instruments and their accessories   |
| IEC | 60060         | High Voltage Test Techniques   |
| IEC | 60076         | Power Transformers   |
| IEC | 60085         | Thermal Evaluation And Classification of Electrical Insulation.  |
| IEC | 60086         | Primary Batteries  |
| IEC | 60099         | Surge Arrestors  |
| IEC | 60137         | Bushings For Alternating Voltages Above 1,000 V  |
| IEC | 60228         | Conductors of Insulated Cables   |
| IEC | 60255         | Electrical relays  |
| IEC | 60269         | Low-voltage fuses  |
| IEC | 60304         | Standard colours for insulation for low frequency cables and wires   |
| IEC | 60354         | Loading Guide For Oil Immersed Transformers  |
| IEC | 60364         | Electrical installations of buildings  |
| IEC | 60372         | Locking devices for ball and socket couplings of string insulator  |
| IEC | 60383         | Insulators for overhead lines with a nominal voltage above 1000 V  |
| IEC | 60437         | Radio interference test on high-voltage insulators (RFI)   |
| IEC | 60551         | Determination Of Transformer And Reactor Sound Levels  |
| IEC | 60664         | Insulation coordination for equipment within low-voltage systems (All Parts)   |
| IEC | 60694         | Common Specifications for high-voltage switchgear and controlgear standards  |
| IEC | 60715         | Dimensions of low voltage switchgear and control gear  |
| IEC | 60895 Ed. 2.0 | b:2002 Live working - Conductive clothing for use at nominal voltage up to 800 kV a.c. and +/- 600 kV d.c.                                       |
| IEC | 60896         | Stationary Lead-Acid Batteries   |
| IEC | 60898         | Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations                                     |
| IEC | 60909         | Short-circuit current calculation in three-phase AC systems  |
| IEC | 60934         | Circuit breakers for equipment   |
| IEC | 61009         | Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)                           |
| IEC | 61089         | Round wire concentric lay overhead electrical stranded conductors  |
| IEC | 61232         | 20SA/A Aluminium clad wires for electrical purposes  |
| IEC | 61477 Ed. 1.2 | b:2005 "Live working - Minimum requirements for the utilization of tools, devices and equipment"   |
| IEC | 61634         | High-voltage switchgear and controlgear - Use and handling of sulphur hexafluoride (SF6) in highvoltage switchgear and controlgear               |
| IEC | 61660         | Short-circuit currents in DC auxiliary installations in power plants and substations   |
| IEC | 62063         | High-voltage switchgear and controlgear - The use of electronic and associated technologies in auxiliary equipment of switchgear and controlgear |
| IEC | 62271         | High Voltage Switchgear and Controlgear (All parts)  |
| IEC | 62285         | Application guide for non-linear coefficient measuring methods   |
| IEC | 62305         | Protection against Lightning   |
| IEC | 17025         | Testing and calibration laboratories   |

#### **Institute of Electrical and Electronic Engineers (IEEE)**

|           |          |   |
|-----------|----------|---|
| IEEE      | 524      | Guide to the installation of overhead transmission line conductors                      |
| IEEE      | 691      | Guide for transmission structure foundation design and testing                          |
| IEEE      | C37.110  | Guide for the Application of Voltage Transformers Used for Protective Relaying Purposes |
| IEEE      | C57.13   | Standard Requirements for Instrument Transformers                                       |
| ANSI/IEEE | C62.1    | IEEE Standard for Surge Arresters for Alternating-Current Power Circuits                |
| ANSI/IEEE | Std 100  | Standard Dictionary of Electrical and Electronic Terms                                  |
| ANSI/IEEE | Std 100  | Standard Dictionary of Electrical and Electronic Terms                                  |
| ANSI/IEEE | Std 1050 | Guide for Instrumentation and Control Equipment Grounding in Generating Stations        |

|           |             |   |
|-----------|-------------|---|
| ANSI/IEEE | Std 1100    | Recommended Practice for Powering and Grounding Sensitive Electronic Equipment  |
| ANSI/IEEE | Std 141     | Recommended Practice for Electrical Power Distribution for Industrial Plants  |
| ANSI/IEEE | Std 142     | Recommended Practice for Grounding of Industrial and Commercial Power Systems   |
| ANSI/IEEE | Std 242     | Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems                                       |
| ANSI/IEEE | Std 367     | Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault          |
| ANSI/IEEE | Std 399     | Recommended Practice for Industrial and Commercial Power Systems Analysis   |
| ANSI/IEEE | Std 446     | Recommended Practice for Emergency and Standby Power Systems  |
| ANSI/IEEE | Std 450     | Recommended Practice for Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations |
| IEEE Std  | 524         | IEEE guide to the installation of overhead transmission line conductors   |
| ANSI/IEEE | Std 665     | Guide for Generating Station Grounding  |
| ANSI/IEEE | Std 80      | Guide for Safety in AC Substation Grounding   |
| ANSI/IEEE | Std 81      | Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System                               |
| ANSI/IEEE | Std C37.101 | Guide for Generator Ground Protection   |

#### **British Standards (BS)**

|    |                  |   |
|----|------------------|---|
| BS | 148              | Unused Mineral Insulating Oils For Transformers And Switchgear                            |
| BS | 729 1971 (1994)  | Specification for hot dip galvanized coatings on iron and steel articles                  |
| BS | 970              | Specification for Wrought Steels for mechanical and Allied Engineering Purposes           |
| BS | 1639             | Methods for bend testing of metals  |
| BS | 1706 1990 (1996) | method for Specifying electroplated coatings of zinc and Cadmium on iron and steel        |
| BS | 4360             | Specifications for Weldable structural Steels   |
| BS | 4604             | Specification for the use of high strength friction grip bolts in structural steelwork    |
| BS | 4848             | Hot Rolled Structural Steel Sections  |
| BS | 5466             | Methods for corrosion testing of metallic coatings  |
| BS | 6231             | Specification for PVC-insulated cables for switchgear and controlgear wiring              |
| BS | 6651             | Protection of structures against lightning.   |
| BS | 7079             | Preparation of steel substrates before application of paints and related products         |
| BS | 7354             | Code of Practice for Design of high-voltage open-terminals stations, Section 7: Earthing. |
| BS | 7361             | Cathodic Protection   |
| BS | 7430             | Code of Practice for Earthing.  |
| BS | 8100             | lattice towers and masts  |

#### **ASTM Standards**

|      |      |  |
|------|------|--|
| ASTM | A36  | Specification for Structural Steel                                     |
| ASTM | A148 | Specification for High-Strength Steel Castings for Structural Purposes |

## **4.5 DETAILED DESIGN OF PLANT AND EQUIPMENT**

The detailed design of plant and equipment including plant layout, protection, control, supervisory interface equipment, earthing, civil works designs etc. shall be carried out by the contractor in accordance with acceptable standards and codes of practice.

Notwithstanding the specifications, technical schedules or plant requirements specified by the tender document, the successful contractor shall be fully responsible for ensuring that the design, manufacture or construction of all items of plant and equipment under this contract to be fully functional, compatible with each other technically and otherwise, complying with IEC and/or other relevant standards, and other safety regulations applicable, and to have the installation complete in all respects including finishing, painting, labelling etc.

The successful contractor shall from the commencement of his contract submit to the Employer's Representative, his conceptual design, detailed designs, technical submissions, design, manufacture and construction drawings, etc. for approval at each stage until the completion of the project.

The Employer's Representative will ensure that any revisions required, or in the absence of any such revisions the approval for such drawings technical submissions, designs or proposals shall be notified to the contractor within a reasonable time period.



## 4.6 PLANT AND EQUIPMENT TO BE SUPPLIED

All items of plant and equipment supplied under this contract shall be of proven design, manufacture and construction, and shall have been in commercial operation for at least Ten (10) years. Tenderer should furnish a list of past orders, indicating the type of equipment, location, country etc. in support of this, together with the contact details of the purchasers and performance reports. **Type test certificates (for that particular model and rating breaker) shall be submitted. Type test conducted by the manufacturer or independent testing laboratories shall be accredited and compliant to ISO/IEC 17025.** Supplier shall furnish the accreditation certificate if requested by EFL.

The Contractor shall guarantee the availability of spare parts for all items of plant and equipment for a period of at least 15 years.

## 4.7 INSPECTION AND TESTING

Type test certificates shall be furnished for all items of plant and equipment with the tender. The Contractor at his cost shall carry out all routine tests as per relevant AS/NZ, IEC or BS standards.

EFL will require their representatives two (2) to inspect the plant/equipment offered by the successful tenderer, before shipment, under this contract and to witness some of the type tests (if adequate type test reports are not provided) and ALL routine tests for the plant and equipment. The associated cost, including return airfare, accommodation and meals, and transportation costs from the hotel to the factory test site, visa and transit arrangements to be included in the tender price in the appropriate section.

All commissioning tests shall be carried out in accordance with the relevant standards. All tools and equipment and instruments for carrying out installation of the circuit breaker shall be made available by the Contractor. The contractor to make a list of Test Equipment's required by the employer as part of commissioning.

The preparation of a list of commissioning tests for each item of plant and equipment will be agreed upon with the Employer's Representative prior to commencing the installation. Contractor to provide their pre-commissioning test results jointly to be carried out with employer representative project engineer.

The Contractor shall provide all facilities for such tests or inspections to be carried out by the EFL's representatives.

## 4.8 TOOLS AND EQUIPMENT

The tenderer shall forward a list of tools and equipment required for operation and maintenance of the installation and include the cost of supplying such tools and equipment in the price Schedules.

## 4.9 FITTING AND ACCESSORIES

The tender shall provide all fittings and accessories applicable to the type of breakers offered and such other fittings as are necessary for the connection to adjacent equipment, satisfactory operation, erection and maintenance of the Circuit Breaker.

## 4.10 TECHNICAL LITERATURE - OPERATIONS AND MAINTENANCE MANUALS

Bidders shall furnish all technical literature, including catalogues, test certificates etc. in support of plant and equipment offered by him with the tender. The successful bidder is to interface existing and new equipment drawings and a set of original drawings in A3.

Successful contractor shall forward 2 (two) binded hard copies of all operations and maintenance manuals, spare parts catalogues, detailed schematic and wiring diagrams and all other documents required for satisfactory operation and maintenance of plant. The originals of the drawings on USB in AutoCAD format 2022 version are required as part of hand over. As built drawings are required to be furnished in 2 copies before the works are taken over as per Clause 5.6 & 5.7 of FIDIC Document (Conditions of Contract for Design – Build And Turnkey) edition 1.

During the design and manufacture stage the contractor shall submit all design calculations, design drawings, technical submissions at each stage of design or manufacture for the approval of the Employer's Representative.

The manuals shall include the following sections:

### 4.10.1 Plant Specification and Description

The Plant Specification and Description Section shall include the specification and description of each plant item and system.

#### **4.10.2 Installation and Commissioning**

The Installation and Commissioning Section shall include step-by-step procedures for the unloading, unpacking, transport, handling, assembly, erection, adjustment, alignment, preparation for service and testing of the plant.

#### **4.10.3 Operation**

The Operation Section shall describe in detail the procedures for the preparation into service, setting, adjusting, checking before and during operation, routine testing and operating of the plant to be supplied. It shall provide complete information on operating limitations, allowable rates of temperature change, allowable temperature differentials and any other information required by operating staff to ensure the safe and efficient operation of the plant.

#### **4.10.4 Maintenance**

The Maintenance Section shall contain sufficient detail to enable maintenance personnel to maintain the plant in good working condition and overhaul the plant from time to time. It shall describe and include pictorial representation of step-by-step procedures for dismantling, reassembly, alignment, replacement and adjustment of all components of the plant.

This Section shall also include standards of workmanship, tolerances, air gaps and electrical resistance values, limits of wear, periodic adjustments, and material specifications including special procedures (e.g. heat treatment), weights of large items, details and uses of special tools, test equipment, jigs, and gauges and tightening torque values for bolts.

The Tenderer shall set down recommendations for preventive or condition based maintenance, including frequency of inspection and guidance in locating and rectifying faults and condition monitoring or diagnostic testing which may be performed on a regular basis. Similarly lubrication routines shall be specified including locations, recommended frequency and recommended type of lubricants.

#### **4.11 TYPE TEST CERTIFICATES**

Copies of Type Test certificates for all plant and equipment shall be furnished as evidence in support of compliance with the specification.

#### **4.12 FACTORY ACCEPTANCE TESTING CERTIFICATES**

The Contractor shall furnish copies of certificates of all routine tests, inspection tests and any other type tests, which would have to be performed at a later stage. The contract shall price for two EFL staffs for the attendance of the Factory Acceptance testing at the Manufactures factory. The work program shall also include the training on maintenance, fault finding and installation and testing procedures.

#### **4.13 SITE CONDITIONS**

The tenderer is required to ascertain for himself the Site Conditions, including limitations of space, geographical, climatic or other considerations. The tenderer shall satisfy himself of the suitability of the Sites for the erection of the plant and equipment to be supplied. The new circuit breaker will be provided installed at the existing location. EFL will provided 1 day outage for the removal of the existing and installation of the new circuit breaker with bypass jumpers. Contractor can later carry out the control wiring and testing. EFL will provide another 1 day outage for the removal of the bypass jumper.

#### **4.14 PACKING**

Equipment shall be carefully packed for transport and shipment in such a manner that it is protected from all dust and climatic conditions during loading, transport, unloading and subsequent storage in the open.

Equipment shall be suitably packed and protected against vibration, movement and shock which may occur during loading and transport. Particular care in packing shall be taken when the apparatus is transported by road.

Instruments and fragile items shall be packed separately. All items, which include delicate equipment, shall be sealed in polythene sheeting and silica gel desiccant or vapour corrosion preventive shall be inserted within the polythene packing. Straw shall not be used as packing material. The breaking units and other insulating units are to be pre-filled filled with SF-6 gas at a slight overpressure.

## 4.15 PROGRAMME AND PROGRESS OF WORK

### 4.15.1 Programme

Within 14 days of acceptance of the Tender the Contractor shall provide the Employer's Representative with a copy of the Programme of work covering design, manufacture, delivery, installation and commissioning.

The programme shall conform to the general requirements of Schedule 7 unless otherwise approved by the Employer's Representative. The programme shall separately detail each item of equipment that is to be transported and delivered separately.

## SECTION 5 – TECHNICAL SPECIFICATIONS

### 5.1 SCOPE OF WORK

The scope of works for this contract is to complete design, manufacture, supply, installation, testing and commissioning of 145kV rated SF-6 outdoor circuit breakers and carry out any other necessary works required in the switchyard in preparation for the installation of the new circuit breaker as replacement of the existing breaker. The works shall include:

1. Supply and installation of one unit (1) of gang pole 3 phase 145kV, 3000A rated SF6 live tank, outdoor circuit breaker in accordance with ASNZ and IEC Standards.
  2. Supply all galvanized support structures and compression palm terminals for connection to the adjacent equipment.
  3. Supply of 1000 pieces of M12 x 75 Stainless Steel full thread bolts and nuts with 2000 pieces of stainless steel conical spring washer 316 grade.
  4. Design and construct pad for the 132kV Circuit Breaker at the same location.
  5. Supply and lay 2.5mmsq control cable and carry out control wiring works on the circuit breaker, Protection & Control panel, Mimic panel and associated interlocks.
  6. Testing and commissioning of the circuit breaker.
  7. Supply, installation and commissioning of complete online condition monitoring system.
  8. Supply the following spares beside the recommended manufacturers spares for the gang pole circuit breaker:
    - i. 2 units of complete operating mechanism/ control cabinet
    - ii. 4 units of spring charge motors
    - iii. 6 units of Trip Coil
    - iv. 6 units of Closing Coil
  9. Supply one unit (1) of single pole 3 phase 145kV, 3000A SF6 Live tank outdoor Circuit Breaker with support structures as spare for EFL's 132kV Transmission circuits.
  10. Supply the following spares beside the recommended manufacturers spares for the single pole circuit breaker:
    - v. 2 units of complete operating mechanism for all 3 phases.
    - vi. 2 unit of control cabinet
    - vii. 4 units of spring charge motors
    - viii. 6 units of Trip Coil
    - ix. 6 units of Closing Coil
  11. Provide comprehensive training on the installation, testing, commission and operation & maintenance of the gang pole and single circuit breaker by the manufacturer. Training to include formal classroom based training and on site training.
  12. Provide two (2) hard copies of the Operation and maintenance manual and two (2) soft copies in USB for gang pole and single pole circuit breaker.
  13. Supply the following tools and equipment:
    - i. Milwaukee Knockout punch
- Note: Any other specialized test set required for the testing and commissioning of the circuit breaker will require to be arranged by the supplier.

Civil coordination :

- a. Foundation Plans.
- b. Prepare the Circuit breaker pads with respect to the base size of the structures of the CB. Carry out full earthing works.
- c. GIS layout drawings indicating all clearance
- d. Static and dynamic load of GIS
- e. Quantity of SF<sub>6</sub> Gas for each circuit breakers
- f. Finalized ventilation design
- g. AC/DC load requirements standing and maximum
- h. HVAC test set up

Technical documents to be included in the offer

- i. Single line diagram
- j. Gas Section diagram
- k. Layout of GIS
- l. All Schedules duly filled
- m. List of deviations from the specifications
- n. Evidence of type test reports
- o. Details catalogue, literature of proposed GIS, its service records in Australia and New Zealand and other tropical countries

#### 5.1.1 Installation and Others

The scope for the contractor also covers complete installation, testing and commissioning of the new circuit breaker together with complete training on the installation, operation and maintenance on the equipment supplied. This shall also include the installation and commissioning of the online conditioning monitoring system. Any other works necessary to carry out installation of the circuit breakers is also part of the

contractor's scope of works. After finalizing of the contract, suitable dates shall be mutually agreed for having outages to carry out the replacement of the circuit breakers.

All wiring and necessary work relating to interfacing the circuit breakers with the existing protection scheme, together with complete testing is also under the scope of the contractor. The successful Contractor shall forward a suitable training programme on Maintenance & Operations of the installed Switchgear.

## 5.2 GENERAL

This part of the Specification covers the design, ratings, testing, shipping, installation and commissioning of factory assembled, type tested 145kV circuit breakers. Spare parts required for operation & maintenance, shall be quoted, separately as required by the Schedules of Rates & Prices. The complete documentation, drawings, manuals, etc. shall be included in the Supply and will be subject to the approval of the Employer's Representative according to the requirements of these Specifications.

If a substantial improvement of any or all of the specified requirements expressed or implied herein is available from the Tenderer, and this improved design offers economic advantages to the Employer, this should be offered as an alternative, together with the basic proposal which shall conform to the requirements of these Specifications.

The 145kV circuit breaker shall be suitable for outdoor operation under the climatic condition at site as specified in the General Specifications Section. The General requirements of the circuit breaker as outlined in the table below (detailed enquiry data sheet is provided in the schedules for the bidder to fill in.

| <i>General Requirements</i>                                    | <i>Description</i>   |
|--|--|
| Rated Voltage and System                                       | 145kV, 3 phase, 3 wire, 50Hz   |
| Switchgear Type  | Outdoor, Live tank, disconnecting type (non-withdrawable), single column, SF-6 circuit breaker |
| Single pole/three pole operation                               | Single pole and three pole   |
| Rated Lightning impulse withstand                              | 650kV peak minimum   |
| Rated 1 minute power frequency withstand                       | 275kV rms  |
| Rated Normal Current   | 3000A  |
| Short circuit rms breaking current                             | 40kA   |
| Short time current duration                                    | 3s   |
| Rated Making current peak                                      | 100kA  |
| Supply voltage of opening and closing devices and aux circuits | 110V DC  |
| Operating mechanism  | 110V DC motor wound spring charged   |

### 5.3 CONSTRUCTION AND TYPE

Circuit breakers shall provide rapid and smooth interruption of current under all conditions, completely suppress all undesirable phenomenon even under most severe and persistent short circuit conditions or when interrupting small reactive currents, leading or lagging. The circuit breakers offered shall be re-strike free under all operating conditions.

### 5.4 TEMPERATURE RISE

Temperature rise of current carrying parts shall be limited to the values stipulated in IEC 60694, i.e. +65°C for silver-plated contacts, +75°C for silver-plated connections, and +50°C for all other exposed parts, under rated current and the environmental conditions. Thermal rating for all current carrying parts shall be a minimum of one second for the rated symmetrical short circuit current. If the maximum short circuit time must be extended, the  $I^2 \times t$  value shall remain constant.

### 5.5 BUSHING AND INSULATORS

The porcelains used shall be brown, monogamous and free from cavities or other flaws. They shall be designed to have ample insulation, mechanical strength and rigidity for satisfactory operation and under conditions specified above. All bushing of identical ratings shall be interchangeable. The puncture strength of the bushing shall be greater than the flash over value. The bushings shall entirely be free from radio disturbance when operating at a voltage up to or 10% above rated voltage and shall also be free from external and internal corona.

Self-contained bushings within the scope of IEC 137 shall be separately rated and tested in accordance with that standard. The Tenderer shall also show by partial discharge dissipation factor measurements (maximum of 1%) or by other means that the bushing, when mounted in a complete circuit breaker, have a satisfactory electrical stress distribution pattern. The Tenderer shall supply drawings showing the construction and mounting of all terminals and bushings or equivalent insulation in sufficient detail to indicate the mechanical strength characteristics of the solid insulation characteristics of the solid insulation material used. Bushing construction shall be such as to allow free expansion of the central conductor.

Partial discharge probes shall be provided for ease of testing. An on-line partial discharge monitoring device needs also to be furnished on each bushing.

**The insulator shall be from reputable German manufactures.** The minimum creepage distance shall be 5270mm or as per the relevant IEC standards. In case this parameter specified contradicts with the standard, the greater value shall prevail.

### 5.6 OPERATING MECHANISM

The operating mechanism shall be Motor operated spring charging mechanism and „trip free“, whereby the circuit breaker can perform a complete opening operation even if the trip command is activated during a closing operation. The closing and trip coil shall be rated at 110V DC but must additionally have operational capability to accommodate variations in supply voltage:

- Min voltage (auxiliary equipment): 85% of rated voltage
- Max voltage (auxiliary equipment): 110% of rated voltage
- Min voltage (close circuit): 85% of rated voltage
- Max voltage (close circuit): 110% of rated voltage
- Min voltage (trip circuit): 75% of rated voltage
- Max voltage (trip circuit): 110% of rated voltage

The mechanism is to be provided with two trip circuits with independent trip coils. The mechanism is to be operated electrically through local or remote control, and also mechanically, including slow closing. It shall also be possible to charge the spring manually when DC supply is temporarily not available, and the necessary additional equipment for this shall also be provided. As required for maintenance, a suitable counter for recording the number of operations of Circuit Breakers shall be provided.

All working parts of the mechanism shall be of corrosion resistant material and all bearings which require greasing shall be equipped with pressure grease fittings. The mechanism shall be positive quick in action and shall be removable without disturbing the other parts of the Circuit Breaker. The mechanism and the breaker shall be such the failure of any spring will not prevent tripping and will not cause faulty tripping or closing. Provision of necessary interlocks (electrical and/or mechanical to ensure that the following operations are not possible when the circuit breaker is in service:

- (i) Closing operation when the breaker is already closed
- (ii) Closing operation during an opening operation.

Each mechanism shall be so designed as to enable a continuous sequence of opening and closing operating possible as long as power is available to the motor. The operation of the breakers shall be independent of motor which shall be used only for the purpose of charging the closing spring. The rating of the motor shall be such that it does not require more than about 30 seconds for charging the closing spring. The closing action of the Circuit Breaker shall charge the opening springs ready for tripping. The operating mechanism should be capable of carrying out an open-close-open (O - 0.3 s - CO) sequence with no external power supply to the operating mechanism. The circuit breaker shall, after a closing operation, always be able to trip immediately without intentional time delay. The operating duty cycle of the circuit breaker is to be O - 0.3 s - CO - 3 min - CO.

The operating mechanism along with the accessories shall be mounted in a weather proof, corrosion resistant, IP56 and dust tight housing attached to the structure. Hinged doors with gaskets, catches for securing the doors in open position and handle operated latching mechanism with provision for padlocking shall be provided on the cabinets to allow easy access to all parts of the equipment mounted therein. A local electrical control switch and breaker position indicator shall be provided for manual operation for maintenance purpose. A local/remote changed over shall also be provided in the housing. The closing and operating coils shall be designed to operate at normal voltage. A heater shall be provided in the cabinet to prevent moisture condensation. AC power supply of auxiliary shall be available at 415V 3 Phase, 50 Hz or 240V single phase. Necessary cable glands for the cables of the operating mechanism shall be provided. If the manufacturers design permits the cabinet shall be stainless steel 316 grade.

## **5.7 CONTROL AND INDICATION**

### **5.7.1 Circuit Breaker Control**

The circuit breakers shall be suitable for remote control. Manual, mechanical ON-switching shall be prevented if interlocking condition exists. Each circuit breaker shall be furnished with a mechanical position indicator without electrical intervention. A mechanical position indicator shall be provided for each pole of the breaker, mounted on the structure in an easily visible location. The indicator shall provide information about the position of the contacts, whether they be closed ("ON" in Red), open ("OFF" in Green) or in an intermediate ("INTERMEDIATE" in Orange) position and also the spring charge indication. In addition, electrical indication shall be provided in the control cabinet, by means of lamps indicating the position of the breaker and spring charge. Operation counters shall be provided.

Facility has to be provided via one of the existing cabinets, or through a separate cabinet for local three-pole operation, since this specification is for single pole units. The three single-pole circuit breakers are to be interlocked such that they all operate at the same instant in response to a manual trip or close command. A local/remote control switch shall be provided through this cabinet to transfer control from the Employers control and protection scheme to the local pushbuttons and switches. This cabinet is to also act as marshalling cubicle for all signaling (alarms, indications, etc.). If the manufacturers design permits the cabinet shall be stainless steel 316 grade.

Control switches shall be of discrepancy type and arranged to operate clockwise when closing the circuit breakers and anti-clockwise when opening them. They shall be designed to prevent accidental operation. Two independent movements shall affect operation of switches of the discrepancy type. Control switches for circuit breakers shall be of the non-locking type with spring return to the "neutral" position. The contacts of switches shall be strong and have a positive wiping action when operated. Control switches shall be provided with labels to give clear indication as to the direction of each operation, for example, "Open" "Close" etc.

### **5.7.2 Trip Circuit Supervision**

Provision of a trip circuit supervision circuit for each trip circuit to enable checking of the connection between the protection trip relay (in control room) and the operating mechanism and the trip coils. The Trip circuit Supervision device should be in parallel with the trip circuit, sending a very low testing current through the circuit to check the integrity of the circuit. Provision has to be made to avoid inadvertent tripping of the circuit breaker, should there be a short circuit in one of the components of the trip coil supervision circuit by way of a series resistor, or by any other means. There is currently 1 trip coil supervision circuit.

### **5.7.3 Protective Trip**

The protection trip in the trip circuit is to be directly bypassing the local/remote selector switch.

### **5.7.4 Auto-Reclose**

Not Required.

### **5.7.5 Phase Discrepancy**

The single pole circuit breaker shall include phase discrepancy circuit, to enable indication of whether all the phases (poles) are in the same position. If the poles are in different positions, a time delay starts and after a pre-set time, a trip order and alarm is initiated. This is the existing scheme currently implemented and the new circuit breaker shall have the same.

### 5.7.6 LED Indications

Pushbuttons shall be oil tight, and with the exception of emergency stop-buttons shall be the shrouded type. Pushbuttons shall provide weatherproof seal where they pass through panels and enclosures. Contacts shall be of the double air-break, self-cleaning and aligning type with silver surfaces and a minimum rating of 10 amps at 110V D.C. It shall be possible to modify the contact arrangements by changing contact blocks.

## 5.8 LOW VOLTAGE EQUIPMENT AND CONTROL CIRCUITS

### 5.8.1 Secondary Wiring

All secondary control wiring in circuit breakers, panel wiring and the like shall be carried out in a neat and systematic manner with cable supported clear of the panels and other surfaces at all points to obtain free circulation of air. In all cases, the sequence of the wiring terminals shall be such that the junction between multi-core cables and the terminals is effected without crossover. Claw washers or crimped connectors of approved type shall be used to terminate all small wiring. Insulating bushings shall be provided where necessary to prevent the chafing of wiring. All PVC insulated panel wiring shall comply with the requirements of BS 6231 Type A or B as appropriate.

Conductors shall generally have a minimum cross section equivalent to 50/0.25mm (2.5mm<sup>2</sup>) but single stranded conductors should only be employed for rigid connections which are not subject to movement of vibration during shipment, operation or maintenance. Flexible conductor's equivalent to 2.5mm<sup>2</sup> shall only be employed with written approval of the purchaser. All core cables will be PVC-PVC type with steel wire armor.

Terminal strips of the line-up type are preferred for all control wiring requiring external connections. Terminals must be corrosion-proof, and use indirect pressure, captive screw type mechanisms. Internal wiring terminations of the push-on type, e.g. AMP plugs, are acceptable, and wire-wrap connections are preferred for matrix-connections on electronic sub-assemblies. All secondary wiring to be performed at Site shall enter the terminal block at one side only.

Terminal strips for different voltage levels must be physically separated from each other and suitably identified. Terminals carrying dangerous voltages even when the main breakers are off, must be marked with a particular colour and carry suitable warning labels. Further terminals shall be provided for the voltage transformers, which shall permit instruments to be connected without interrupting the secondary Voltage transformer circuits. There shall be 60 spare terminals for EFL's internal protection schemes per circuit breaker.

Wire colors shall be as follows:

| <i>Wire Colour</i>        | <i>Circuit Particulars</i>                              |
|---------------------------|---|
| Brown                     | DC Indication Circuits                                  |
| Grey                      | DC Circuits, other than Indication circuits             |
| Green with Yellow Stripes | Connections to earth                                    |
| Black                     | AC Neutral connections to the secondary circuits of CTs |
| Any other colors          | Connections other than above                            |

All wires shall be fitted with numbered ferrules of approved type at each termination. At points of interconnection between wiring, where a change of numbering cannot be avoided, this shall be clearly indicated on the wiring diagram and both ferrules of approved type at each termination. At points of interconnection between wiring, where a change of numbering cannot be avoided, this shall be clearly indicated on the wiring diagram and both ferrule numbers shall appear at each end of each wire. The ferrules on all wiring directly connected to circuit breaker trip coils, tripping switches, etc. shall be of a color, preferably red, different from that of the remainder and marked "T" or "trip". No wires may be tied or jointed between terminal points.

### 5.8.2 Miniature Circuit Breakers and Links

Facilities shall be provided for protection and isolation of circuits associated with protection control and instruments. They shall be of approved type and grouped, as far as possible, according to their functions. They shall be clearly labelled, both on the panels and the associated wiring diagrams. Facilities shall be provided to enable the control circuits for circuit breaker to be individually isolated for maintenance purposes. A label shall be fixed immediately below each CB clearly showing the rating of the fuse link and its function.

### 5.8.3 Auxiliary Switches

Auxiliary switches (contacts) with minimum of eight (8) each of „normally open“ and normally closed“ types shall be provided on each Circuit Breaker for use in remote indication and control scheme of the Circuit Breaker and for providing safety Interlocking. There shall be provision to add more auxiliary switches at a later date, if required. It shall preferably be possible to convert “normally open” and “normally closed” to “normally closed” and “normally open” type contacts respectively with minor modification. The extra cost for supplying additional contacts of each type shall be indicated in the tender. Necessary auxiliary switches shall also be provided for remote indication of the spring being in charged position.



## 5.9 INTERLOCKING

The breakers shall be suitable for being interlocked with their associated isolators with interlocks of the electrical type which shall enable interlocking to prevent the opening/closing of isolator when the breaker is closed or as may be required. Currently there are no interlocks on the breaker itself, however, the isolators are interlocked to prevent opening when the circuit breakers are closed.

## 5.10 CONTACTS

The main contacts shall have ample area and contact and shall be adjustable to allow for wear, be easily replaceable and shall have minimum of moveable parts and adjustment. The main contacts shall be first to open and last to close so that there is negligible contact burning and wear in case arcing contacts are provided. The wear of the contacts shall be monitored through an on-line monitoring system as specified in this specification.

## 5.11 MOUNTING

Circuit breakers shall be suitable for mounting on hot dip galvanized steel structures as per BS 1461 and ASTM A36 (to be provided with each circuit breaker pole). Each circuit breaker is to have a Load diagram for the steel structures under the severest operating conditions of the equipment shall be furnished with the tender.

## 5.12 TERMINAL CONNECTORS

Each Circuit Breaker connected with incoming and outgoing feeders shall be provided with solder less clamp type terminal connectors of suitable size. Each terminal connectors shall be suitable for both vertical and horizontal take off and shall be tin-plated so as to make them suitable for being connected to ACSR conductor. Each Circuit Breaker pole and control cabinet shall provided with appropriate number of grounding terminal and clamps receiving ground connections. The contractor is to carry out all necessary jointing and terminations on the 145kV circuit breaker terminals.

## 5.13 SF-6 DENSITY MONITORING

The circuit breakers shall have one SF6 filling valve, one SF6 sampling valve and one SF6 pressure gauge. The contractor shall provide sufficient SF6 gas to top off all the circuit breakers prior to pre-commissioning. Each circuit breaker pole is to be equipped with means of monitoring the density of the SF-6 gas contained within the interrupting unit and the supporting insulator, accompanied by appropriate pressure switch to allow alarming in case of low pressure due to gas leakage. The first alarm level shall provide an indication and the second shall trip the breaker immediately and internally locking out the closing operation. The density of the gas in the SF6 breaker shall always be greater than the required insulating density for the SF6 at the rated voltage.

## 5.14 CORROSION PROTECTION

In choosing materials and their finishes, due regard is to be given to the humid tropical conditions under which equipment is to work. Equipment offered shall be constructed of materials and be finished in such a way that it is corrosion free during the life.

- i) Current carrying parts shall be made from non-ferrous metal.
- ii) Materials and combinations of materials used in the construction of the equipment shall be selected and arranged to prevent electrolytic corrosion
- iii) Aluminum and its alloys, whether used for current carrying or structural purposes, shall be resistant to auto electrolytic and chemical action
- iv) Ferrous parts shall be either hot-dip galvanized BS 1461.

Surfaces to be galvanized, clean and free from harmful scale, rust, grease, moisture or any other foreign matter which will in any way detract from the life and usefulness of the coating. All ferrous parts of the breakers and support structure and mounting including bolts, nuts etc. shall be hot dip galvanized.

## 5.15 CONDITION MONITORING SYSTEM

The gang pole circuit breaker shall be supplied with the complete online condition monitoring system. This shall include all necessary hardware required for the interfacing the circuit breaker points with the EFL's existing SCADA system. The remote HMI shall be setup at EFL's Cunningham Substation. The system shall be able to store data locally. The condition monitoring system shall provide the following functions but not limited to:

- CB Position

- Coil behavior
- Operation Time
- Operation Counter
- Auxiliary Voltage Monitoring
- Coil Continuity check
- SF6 Alarm & Lockout
- SF6 density monitoring

The condition monitoring system shall provide operator, superuser

## 5.16 SPARES

The tenderer shall forward a list of manufacturer's mandatory spare parts including but not limited to contacts, o-rings, trip coils, spring release coils, and spring charging motor, required for operation and maintenance, and any other special erection tools including leakage detectors, of the plant and equipment supplied under this contract for a period of 5 years. The cost of supply of these spare parts shall form part of the contract. The tenderer shall also forward a list of optional spare parts which shall not form part of the contract but should be shown in a separate price schedule.

The successful contractor shall ensure the availability of spare parts for operation and maintenance of all the items of equipment for a period of at least 15 years.

The Contractor shall include a list of recommended maintenance tools. The list shall include as a minimum:

1. Two (2) sets of standard tools,
2. One (1) sets of special tools, required for manual operation, for testing, alignment, repair or realignment of the parts.

The recommended maintenance tools are to be priced separately, such that they may be purchased by the Employer as part of the Contract.

## 5.17 COMPLETENESS OF EQUIPMENT

Any item, accessory or apparatus which may not have been specifically mentioned in these specifications but which are necessary shall be supplied by the contractor without extra charge. All plant and equipment shall be complete in all details.

## 5.18 INSTALLATION

The contractor is to furnish a comprehensive installation plan, together with methodology, procedure, duration, material and manpower resources. This shall be included with the tender submission.

## 5.19 SCHEDULED OUTAGES

EFL will provided 1 day (12 hours) outage for the removal of the existing and installation of the new circuit breaker with bypass jumpers. Contractor can later carry out the control wiring and testing. EFL will provide another 1 day (12 hours) outage for the removal of the bypass jumper.

When considering the duration of the outages, it should be taken into account that the employer will take one half hour to apply the system earths at the start of the outage, and one half hour to remove the system earths at the end of the period. In the outage duration, the contractor must also allow for the contractor's working earths to be applied and removed. The contractor must build into the program of works all foreseeable outages based on the above requirements.

## 5.20 EARTHING

All metallic portions of the circuit breakers which do not form part of the primary or secondary circuits are to be earthed through appropriately sized PVC insulated or bare copper conductors. The steel structures supporting the insulators and interrupter units are to be earthed via flat bare earthing copper bars and shall be tied to the main substation earth grid. All doors etc. of the control cubicles to be earthed via appropriate copper conductors.

## 5.21 ELECTRICAL AND MECHANICAL LIFE

Assuming normal service and operating conditions as stipulated in this specification, the circuit breakers are to have a service life exceeding 30 years, or a minimum of 10,000 mechanical (no load) operations. The tenderer to furnish a graph of the number of lifetime operations of the circuit breaker against the current during breaker operation.

## 5.22 NAMEPLATE

Each circuit breaker and its operating devices must have its own rating plate. The rating plate shall be weather proof and corrosion proof, bolted or riveted onto the unit and visible from normal service position, with information according to IEC 62271, i.e. at least the following:

- manufacturer's name
- Date of manufacture
- type and serial number
- Insulating medium
- rated voltage
- rated lightning impulse withstand voltage
- rated frequency
- rated normal current
- rated short circuit breaking current
- Rated duration of short circuit current
- First pole-to-clear factor
- Rated Line charging breaking current
- Rated SF-6 filling pressure
- Rated SF-6 alarm pressure level
- Rated SF-6 trip pressure level
- rated supply voltage of closing and opening devices
- rated supply voltage and frequency of auxiliary circuits
- weight
- Rated operating sequence
- Temperature class
- Actual rating at site conditions.

## 5.23 DRAWINGS AND INSTRUCTIONS MANUALS

Soon after award of the contract the manufacturer shall supply the drawings which will describe the equipment and details for approval. The following drawings for each item are to be supplied as part of the contract:-

- (x) Outline dimensional drawings, showing transport weight
- (xi) Outline drawings of bushings.
- (xii) Assembly and sub-assembly drawings with numbered parts.
- (xiii) Sectional view showing the general constructional features of operating mechanism and are extinguishing chambers.
- (xiv) Dimensions and assembly of important auxiliaries.
- (xv) Detailed drawings of operating mechanism.
- (xvi) Details of electrical interlocks provided with Circuit Breakers.
- (xvii) Drawing showing the foundation details.
- (xviii) Sectional view of the Circuit Breakers poles.
- (xix) Schematic and connection diagrams.
- (xx) Test certificate and oscillograms.

Two copies of instruction manuals covering instruction for installation, operation and maintenance shall be supplied by the tenderer.

## 5.24 TESTING AND COMMISSIONING

Each Circuit Breaker shall be completely assembled and subject to manufactures standard routine tests in accordance with IEC-62271 in the presence of the employer's representative. Type test certificates for proof of having tested the breaker fully according to IEC-62271 shall be supplied with the tender.

### 5.24.1 Type Tests

Type tests shall be performed on switchgear bays and circuit breakers of each different type if type test certificates are not made available with the Tender Proposal. Circuit Breakers shall be covered by type test reports issued by a recognized short-circuit testing station certifying the operation of the circuit -breaker at duties corresponding to the operation of the rated breaking capacities of the circuit breakers. The test duties shall not be less than the requirements of IEC 62271. Test certificates shall be submitted with the Tender. Type tests may be waived if satisfactory type test certificates are submitted with the tender. All defects detected as a result of testing shall be repaired by the manufacturer at their expense and shall be documented and corrected prior to shipment. If, in the opinion of the Employer's Representative, re-testing is required after such repairs, this shall also be at the expense of the Contractor. Acceptance by the Employer's Representative of any equipment shall not relieve the manufacturer and the Contractor from any of his performance guarantees, or from any of his other obligations resulting from this contract.

Type tests to consist of a minimum of the following tests (IEC 62271-100):

- (i) Dielectric tests
- (ii) Radio Interference Voltage (RIV) tests
- (iii) Temperature rise tests
- (iv) Measurement of the resistance of the main circuit
- (v) Short-time current and peak withstand current tests
- (vi) Mechanical and environmental tests
- (vii) Making and breaking tests

#### **5.24.2 Routine Tests (Factory Tests)**

Routine tests of each circuit breaker, or apparatus manufactured have to be successfully carried out in accordance with the IEC recommendations. Special tests may be agreed upon between and the Employer's Representative prior to order placement. The cost of the

routine factory acceptance test shall be Bourne by the bidder for seven working days (excludes air travel time) which shall include the air fare for two representatives, meals, accommodation and transportation to and from Hotel, airport, restaurants and factory and telephone and internet facilities. Routine factory tests, to consist among others of the following:

- (i) Power frequency voltage withstand dry test on the main circuit
- (ii) Voltage withstand tests on the control and auxiliary circuits at 2,000 V, 1 min
- (iii) Measurement of the resistance of the main circuit. The resistance of the main circuit should be less than 1.2 times the value obtained at the type test.
- (iv) Tightness test
- (v) Design and visual Checks, including nameplate check, identification of auxiliary equipment, corrosion protection and values of resistors and capacitors connected to main circuit.
- (vi) Mechanical operating tests. Operation of the circuit breaker at rated, minimum and maximum supply voltages, operating sequences together with operating times and speed.
- (vii) Partial discharge test
- (viii) Other Checks:
  - a. Functional check of auxiliary and control circuits
  - b. Measurement of the resistance of the heaters and control circuits
  - c. Inspections of the wiring of the control, heater and auxiliary equipment circuits
  - d. Inspection of the control cubicles (electrical and mechanical)
  - e. Recharging durations
  - f. Operations of the electrical and mechanical interlocks and signaling devices
  - g. General performance of the equipment within the required tolerance of the supply voltage
  - h. Inspection of earthing terminals of the circuit breaker.

#### **5.24.3 Inspection Checks upon Arrival to Site**

The following checks will be carried out on the equipment after arrival onto site together with the Contractor and the Employer's Representative.

- (i) Checking of the package contents against the packing list
- (ii) Visual inspection for any damage or missing items.

#### **5.24.4 Commissioning Tests**

The manufacturer shall produce a programme of site commissioning checks and tests which shall include as a minimum (the schedule below is to be used as a guideline and is based on the IEC 62271 recommended commissioning procedures):

##### ***Pre Commissioning***

- (i) General checks on conformance to drawings and specifications, tightness, external insulation, paint and corrosion protection, operating devices and integrity of the earth connection.
- (ii) Recording of number of circuit breaker operations upon delivery, completion of site testing, energization.
- (iii) Electrical circuit checks for conformity to wiring diagram, operation of signaling (positions, alarms, lockouts), and operation of heating and lighting.
- (iv) Checks of SF-6 filling pressure/density and quality checks.
- (v) Verification of operating sequence and measurement of time quantities, including operating and recharging times.
- (vi) Other tests:
  - a. Open-Close tests
  - b. Behavior of CB on closing command when an opening command is present.
  - c. Pole discrepancy protection verification
  - d. Dielectric Tests on main and auxiliary circuits
  - e. Measurement of resistance of main circuit.
  - f. Functional protection tests.

##### ***Commissioning***

- (i) General checks on conformance to drawings and specifications, tightness, external insulation, paint and corrosion protection, operating devices and integrity of the earth connection.

- (ii) Checks of SF-6 filling pressure/density and quality checks.
- (iii) Other tests:
  - a. Pole discrepancy protection verification
  - b. Dielectric Tests on main and auxiliary circuits
  - c. Measurement of resistance of main circuit.
  - d. Functional protection tests.

## 5.25 TRAINING

The Authority requires EFL personnel to be attached to the contractor's project team for the entire phase of the project to be trained on installation, operation, maintenance of equipment and condition monitoring equipment to be supplied under this contract.

Basic Contents:

- (i) Installation of the supplied switchgear.
- (ii) Testing & commissioning of switchgear prior to commissioning.
- (iii) Maintenance practices for the supplied equipment as recommended by the Manufacturer.
- (iv) Hands on training on test equipment's, which are required for maintenance of installed equipment.
- (v) Hands on training on periodic adjustment required, and parts replacement procedure in Circuit breaker mechanism, interrupters, spare parts, and any other components as per manufacturer's recommendations.
- (vi) Training on the complete gas-filling equipment supplied, including checking the gas pressure and topping up.

All of the above training will be conducted prior to installation, preferably 2 weeks in advance, to be carried out by a manufacturer's recommended trainer(s). The contractor is to submit with this tender a detailed resume of the proposed trainers. After installation, a de-briefing session will be conducted by the contractor's engineer. **A detailed training plan is to be submitted, together with durations, and course contents as part of the tender submission.**

## 5.26 GUARANTEED TECHNICAL PARTICULARS

The tenderer shall furnish all guaranteed technical as per the Schedules of this specification

## SECTION 6 – SCHEDULES OF SUPPLEMENTARY INFORMATION

### 6.1 TECHNICAL PARTICULARS AND GUARANTEES

|     | <i>Item</i>   | <i>Units</i> | <i>Required</i>        | <i>Tendered</i> |
|-----|---|--------------|------------------------|-----------------|
|     | <b>145KV SF-6 CIRCUIT BREAKERS</b>                            |              |                        |                 |
| 1.  | Manufacturer's Name   |              |                        |                 |
| 2.  | Country of Manufacture  |              |                        |                 |
| 3.  | Place of Testing  |              |                        |                 |
| 4.  | Applicable Standards – IEC62271, IEC60694, etc                |              |                        |                 |
| 5.  | Manufacturer's type designation, and type ref or model number |              |                        |                 |
| 6.  | Type tested   | Yes/No       | Yes                    |                 |
|     | Testing Authority   |              | Compliant to IEC 17025 |                 |
| 7.  | Type test Report, Ref No.                                     |              |                        |                 |
| 8.  | Rated Voltage   | kV           | 145                    |                 |
| 9.  | Rated Frequency   | Hz           | 50                     |                 |
| 10. | Rated Normal Current at 40°C                                  | A            | 3000                   |                 |
| 11. | Rated Current at Max. ambient temperature - 50°C              | A            | 3000                   |                 |
|     | Rated Lightning Impulse Withstand (peak)                      |              |                        |                 |
| 12. | - To Earth and between phases                                 | kV           | 650                    |                 |
|     | - Across open poles   | kV           | 650                    |                 |
|     | Rated 1 min Power Frequency Withstand (rms)                   |              |                        |                 |
| 12. | - To earth and between phases                                 | kV           | 275                    |                 |
|     | - Across open poles   | kV           | 275                    |                 |
|     | Rated short circuit breaking current                          |              |                        |                 |
| 14. | - Symmetrical (rms)   | kA           | 40                     |                 |
|     | - DC Component  | %            |                        |                 |
| 15. | Rated short circuit breaking current (asymmetrical, r.m.s)    | kA           |                        |                 |
| 17. | Rated Duration of Short Circuit Current                       | s            | 3                      |                 |
| 23. | First pole-to-clear factor                                    |              | 1.5                    |                 |
| 16. | Rated making current (peak)                                   | kA           | 100                    |                 |
| 18. | Rated cable charging breaking current                         | A            | 160A                   |                 |
| 19. | Rated line charging breaking current                          | A            | 50A                    |                 |
| 20. | Rated small inductive breaking current                        | A            |                        |                 |
|     | Rated out of phase breaking current                           | kA           |                        |                 |
|     | Rated transient recovery voltage at 100% sc current           | kV           |                        |                 |
| 21. | Voltage drop across terminals of one pole at rated current    | mV           |                        |                 |
| 24. | Rated operating sequence                                      |              | O-0.3 sec-CO-3 min-CO  |                 |
| 26. | Closing time  | ms           | 68                     |                 |
|     | - tolerances  | ms           | 7                      |                 |
| 27. | Opening time  | ms           | 36                     |                 |

|                              | <i>Item</i>  | <i>Units</i> | <i>Required</i>                           | <i>Tendered</i> |
|------------------------------|--|--------------|---|-----------------|
|                              | - tolerances   | ms           | 4   |                 |
| 28.                          | Break time at full rated breaking current  | ms           |   |                 |
|                              | - tolerances   | ms           |   |                 |
|                              | Dead Time  | ms           | 300                                       |                 |
|                              | - tolerances   |              |   |                 |
| 29.                          | Make time (max.)   | ms           |   |                 |
|                              | - tolerances   | ms           |   |                 |
| 30.                          | Arcing time (max.) at full short circuit duty  | ms           |   |                 |
|                              | - tolerances   | ms           |   |                 |
|                              | Minimum reclosing time at rated interrupting capacity from the instant of trip coil energization       | ms           |   |                 |
| 31.                          | Life duration of main contacts (no load mechanical operations)   | Operations   |   |                 |
| 32.                          | Number of switching operations at rated breaking capacity before contact maintenance becomes necessary | Operations   | 6000                                      |                 |
| 38.                          | Max. temperature rise of contacts at rated normal Current  | K            |   |                 |
| 39.                          | Arc quenching medium   |              | SF-6                                      |                 |
| 40.                          | Material of main contacts  |              |   |                 |
| <b>OPERATING MECHANISM</b>   |  |              |   |                 |
|                              | Type of Operating mechanism  |              | Motor wound spring charged                |                 |
|                              | Operation (Single pole/three pole)   |              | Gang pole(1 unit)<br>Single Pole (1 unit) |                 |
|                              | Number of mechanisms per pole for single pole circuit breaker  |              | 1   |                 |
|                              | Fixed trip/trip free   |              | Trip free                                 |                 |
| 36.                          | Motor Voltage  | V DC         | 110                                       |                 |
| 37.                          | Motor Power  | W            |   |                 |
| 34.                          | Making coil  |              |   |                 |
|                              | - Rated voltage  | V DC         | 110                                       |                 |
|                              | - min. operating voltage   | V            | 88  |                 |
|                              | - Rated power each   | W            |   |                 |
| 35.                          | Trip coil  |              |   |                 |
|                              | - Number of coils  |              | 2   |                 |
|                              | - Rated voltage  | V DC         | 110                                       |                 |
|                              | - min. operating voltage   | V            | 55  |                 |
|                              | - Rated power each   | W            |   |                 |
| 33.                          | Auxiliary contacts:  |              |   |                 |
|                              | - number NO/NC   |              |   |                 |
|                              | - voltage rating   | V DC         | 110                                       |                 |
|                              | - current rating   | A DC         |   |                 |
| <b>CONSTRUCTION FEATURES</b> |  |              |   |                 |
|                              | No of poles per circuit breaker  | 3            |   |                 |
|                              | Number of breaks per pole  |              |   |                 |
|                              | Type of main contacts  |              |   |                 |



|                               | <i>Item</i>  | <i>Units</i> | <i>Required</i> | <i>Tendered</i> |
|-------------------------------|--|--------------|-----------------|-----------------|
|                               | Material of main contacts  |              |                 |                 |
|                               | Thickness of silver coating on main contacts   | mm           |                 |                 |
|                               | Type of arcing contacts  |              |                 |                 |
|                               | Insulator material (porcelain/composite)   |              | porcelain       |                 |
|                               | Type of supporting insulator   |              |                 |                 |
|                               | Type of steel structure for mounting of circuit breaker  |              |                 |                 |
|                               | Type of terminal for connection of AAC jumper  |              |                 |                 |
| 41.                           | Maximum Shock load imposed on foundation when opening under fault conditions (compression or tension)          | N            |                 |                 |
| 42.                           | Minimum Clearances in air  |              |                 |                 |
|                               | (a) Between phases   | mm           |                 |                 |
|                               | (b) Phase to earth   | mm           |                 |                 |
|                               | (c) Across interrupters  | mm           |                 |                 |
|                               | (d) Live parts to ground level   | mm           |                 |                 |
| <b>DIMENSIONS AND WEIGHTS</b> |  |              |                 |                 |
| 45.                           | Weight of complete single pole circuit breaker, including support insulator, Operating mechanism and cubicles. | kg           |                 |                 |
|                               | Weight of steel support structure  | kg           |                 |                 |
| 46.                           | Weight of heaviest part for shipment   | kg           |                 |                 |
|                               | Overall dimensions of circuit breaker  |              |                 |                 |
|                               | - Including interrupter and supporting insulators  | mm x mm x mm |                 |                 |
|                               | - Total dimension including interrupter, supporting insulators and steel structure                             | mm x mm x mm |                 |                 |
|                               | Quantity of gas in complete breaker  | kg           |                 |                 |
|                               | Routine pressure test on circuit breaker tank  | Bar          |                 |                 |
|                               | Nominal interrupting head gas pressure   | Bar          |                 |                 |
| 47.                           | Period the equipment has been in commercial operation  | years        | > 5             |                 |

## 6.4 WORK PROGRAMME

The tenderer is required to state the commencement and completion dates for the following tentative work programme. The contractor is to also submit a Gantt chart for the programme outlining the activity, duration, start date, completion date, milestones, resources, etc.

|  | <b>Component</b>  | <b>Start Date</b> | <b>Finish Date</b> |
|--|---|-------------------|--------------------|
|  | Design of plant and equipment and approval by employer            |                   |                    |
|  | Manufacture of plant  |                   |                    |
|  | Testing at Manufactures premises (witness testing)                |                   |                    |
|  | Shipping of plant and equipment                                   |                   |                    |
|  | Install and Commission Circuit Breakers                           |                   |                    |
|  | <i>Installation of Circuit Breakers</i>                           |                   |                    |
|  | <i>Completion of wiring for controls and protection equipment</i> |                   |                    |
|  | <i>Inspection and pre-commissioning tests</i>                     |                   |                    |
|  | <i>Testing and commissioning</i>                                  |                   |                    |
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Note that the items in the work programme are the responsibility of the contractor. All site tests to be carried out as per the contract are an absolute minimum. Additional tests may be required by the employer’s representative.

## 6.5 DEPARTURES FROM SPECIFICATIONS

(To be completed by the Contractor)

All deviations shall be forwarded in the format given below. Any details that will lead to deductions of final Tender price shall not be inserted.

| <b>Section</b> | <b>Clause No.</b> | <b>Proposed Deviations</b> |
|----------------|-------------------|----------------------------|
|                |                   |                            |

## 6.6 TENDERER'S STATEMENT OF EXPERIENCE

Tenderer shall state hereunder a brief resume of his experience in the design, supply and erection of 145kV outdoor SF-6 circuit breakers, stating the employer's name, contact person, telephone number and number of units supplied for various recent projects undertaken. The tenderer shall also mention the number of similar projects undertaken whereby the scope was to supply and install 145kV SF-6 breakers.

## 6.7 SCHEDULE OF FINANCIAL INFORMATION

The Tenderer shall state hereunder:

- (a) The full name, business address, nationality and type of organization.
- (b) The full name and business address of any Fijian agent.
- (c) The date of the Tenderer's formation.
- (d) The Tenderer's capitalization and total sales over the preceding three fiscal years.
- (e) Details of supply and erection contracts of a similar nature undertaken in the previous five years, giving details of at least three contracts stating the location, purchaser, dates of commencement and completion and value of the contract in the total foreign currency equivalent.
- (f) Details of any contracts on which the Tenderer has defaulted or on which liquidated damages have been applied in the previous five years giving location, purchaser, value of the contract, and nature of the default or penalty.
- (g) Name and address of two banks and the name and address of an independent accountant, all of whom shall be authorized to provide promptly on request any information about the financial status of the Tenderer which is required by EFL on the understanding that such information will be kept confidential and will only be used to assess the financial ability of the Tenderer to undertake the Contract.

## 6.8 PERSONNEL

The tenderer shall provide a detailed bio-data of all the personnel that would be involved in the execution of the project - from the design stage till the completion stage. The Tenderer shall list herein the personnel he wishes to establish in Fiji for the periods stated, to discharge his responsibilities as laid down in the Specification.

| <b>Designation</b> | <b>Qualification/Experience</b> | <b>No. Required</b> | <b>Period</b> |
|--------------------|---------------------------------|---------------------|---------------|
|                    |                                 |                     |               |

## 6.9 SCHEDULED OUTAGES

EFL will provided 1 day (12 hours) outage for the removal of the existing and installation of the new circuit breaker with bypass jumpers. Contractor can later carry out the control wiring and testing. EFL will provide another 1 day (12 hours) outage for the removal of the bypass jumper and full commissioning of the circuit breaker.

# SECTION 7 – SCHEDULE OF TENDER FORMS

## 7.1 FORM OF TENDER

To: Mr. Jitendra Reddy  
Manager Procurement  
Energy Fiji Limited  
2 Marlow St, Suva  
Fiji

Contract No: \_\_\_\_\_

Gentlemen,

We have examined the Conditions of Contract, Employer's Requirements, Schedules, and Addenda Nos. \_\_\_\_\_ And the matters set out in the Appendix Hereto. We have understood and checked these documents and take full responsibility for them. We accordingly offer to design, execute and complete the said Works and remedy any defects, fit for purpose in conformity with these documents and the enclosed Proposal, for the lump sum contract price of (in currencies, of payment) \_\_\_\_\_ or other such sums as may be determined in accordance with the terms and conditions Of the contract. The above amounts are in accordance with the Price Schedules herewith and are made part of this bid.

We confirm our agreement with the appointment of (name proposed in Tender Data Sheet or during the clarification meeting of the First Stage bid) as the Adjudicator.

We agree to abide by this Tender until \_\_\_\_\_ and it shall remain binding upon us and may be accepted at any time before that date. We Acknowledge that the Appendix to Tender forms part of our Tender.

If our Tender is accepted, we will provide the specified performance security, commence the Works as soon as reasonably possible after receiving the Employer's Representative's notice to commence, and complete the Works in accordance with the above-named documents within the time stated in the Appendix to Tender.

Unless and until a formal Agreement is prepared and executed this Tender, together with our written acceptance thereof, shall constitute a binding contract between us.

We understand that you are not bound to accept the lowest or any tender you may receive.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

| Name and Address of Agent | Amount and Currency | Purpose of Commission or Gratuity |
|---------------------------|---------------------|-----------------------------------|
| _____                     | _____               | _____                             |
| _____                     | _____               | _____                             |

(if none, state "none").

We are, Gentlemen  
Yours faithfully

Signature \_\_\_\_\_ in the capacity of \_\_\_\_\_ duly authorized to sign tenders for and on behalf of

Address \_\_\_\_\_

Date \_\_\_\_\_

## 7.2 APPENDIX TO TENDER

[Note: with the exception of the items for which the Employer's requirements have been inserted, the following information must be completed before the Tender is submitted]

|  | Sub-Clause         |  |
|--|--------------------|--|
| Employer's name and address  | 1.1.2.1<br>* 1.8   | Energy Fiji Limited<br>Private Mail Bag, Suva  |
| Contractor's name and address  | 1.1.2.2<br>& 1.8   | _____  |
| Name and address<br>the Employer's Representative                              | 1.1.2.3<br>* 1.8   | General Manager Network<br>EFL, Private Mail Bag, Suva   |
| Time for notice to commence  | 8.1                | 30 days  |
| Time for Completion of the Works   | 1.1.3.4            | 18 Months  |
| Ruling language  | 1.4                | English  |
| Electronic transmission systems  | 1.8                | Email and Facsimile  |
| Confidential detail  | 1.12               | Nil  |
| Time for access to the Site  | 2.2                | 7 days after the Commencement Date   |
| Amount of performance security   | 4.2                | 10% of the Contract Price, and in the proportions of currencies in which the Contract Price is payable       |
| Time for submission of program   | 4.14               | 14 days after the Effective Date   |
| Normal working hours   | 6.5                | 8.00am to 4.30pm, Monday to Sunday   |
| Liquidated damages for delay   | 8.6                | 0.25% of the Contract Price per day, in the proportions of currencies in which the Contract Price is payable |
| Limit of liquidated damages for delay  | 8.6                | Ten (10)% of the Contract Price  |
| Total amount of advance payments   | 13.2               | Ten (10)% of the contract price or as agreed in the contract.  |
| Number of Instalments  | 13.2               | One (1)  |
| Start repayment of advance payment   | 13.2(a)            | when payments are 10% of the contract Price. Advance Payment to be done if bank guarantee is provided.       |
| Repayment amortization of advance payment                                      | 13.2(b)            | 25%  |
| Percentage of cash retention   | 13.3               | Ten (10)%  |
| Limit of Retention Money   | 13.3               | Ten (10)% of the Contract Price  |
| Minimum amount of Interim Payment Certificates                                 | 13.6               | Five (5)% of the Contract Price  |
| <i>If Sub-Clause 13.15 applies</i><br>Payments in Local and Foreign Currencies | 1.1.5.3<br>& 13.15 |  |

| Currency Unit |              | Amount payable in such Currency |        |
|---------------|--------------|---------------------------------|--------|
| Local:        | _____ [name] | _____                           | [name] |
| Foreign:      | _____ [name] | _____                           | [name] |
|               | _____ [name] | _____                           | [name] |

|  |      |   |
|--|------|---|
| Amount of insurance for design                     | 18.1 | Full value of Contract price                            |
| Amount of third party insurance                    | 18.3 | Contractor to propose                                   |
| Periods for submission of insurance:               | 18.5 |   |
| (a) evidence of insurance                          | *    | Not later than commencement date                        |
| (b) relevant policies                              | *    | Fourteen (14) days after commencement date              |
| Number of members of<br>Dispute Adjudication Board | 20.3 | Three (3)   |
| Arbitration rules                                  | 20.6 | International Chamber of Commerce, Rules of Arbitration |
| Number of arbitrators"                             | 20.6 | Three (3)   |
| Language of arbitration                            | 20.6 | English   |
| Place of arbitration                               | 20.6 | Suva, Fiji  |

Initials of signatory of Tender \_\_\_\_\_

### 7.3 FORM OF CONTRACT AGREEMENT

**This Agreement** made this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_ between \_\_\_\_\_ of Energy Fiji Limited (hereinafter called "the Employer") of the one part and \_\_\_\_\_ of \_\_\_\_\_ (Hereinafter called "the Contractor") of the other part

**Whereas** the Employer desires that the Works known as Supply and Install 145kV Circuit Breaker & CT for Wailoa – Vuda – Cunningham Transmission Line should be designed and executed by the Contractor, and has accepted a Tender by the Contractor for the design, execution and completion of such Works and the remedying of any defects therein.

**The Employer and the Contractor agree** as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement:
  - (a) The Letter of Acceptance dated \_\_\_\_\_
  - (b) The Employer's Requirements
  - (c) The Addenda nos. \_\_\_\_\_
  - (d) The Tender dated \_\_\_\_\_
  - (e) The Conditions of Contract (General Conditions and Conditions of particular Application)
  - (f) The completed Schedules, and
  - (g) The Contractor's Proposal.
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to design, execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor, in consideration of the design, 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.
5. This Agreement shall come into effect on signing by both parties.

**In Witness** whereof the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with their respective laws.

Authorized signature of Employer  
SEAL  
(if any)

Authorized signature of Contractor  
SEAL  
(if any)

in the presence of:

in the presence of:

Name \_\_\_\_\_  
Signature \_\_\_\_\_  
Address \_\_\_\_\_

Name \_\_\_\_\_  
Signature \_\_\_\_\_  
Address \_\_\_\_\_



## 7.4 FORM OF PERFORMANCE GUARANTEE (BANK GUARANTEE)

To: Energy Fiji Limited  
2 Marlow st, Suva  
Fiji

WHEREAS \_\_\_\_\_ [name and address of Contractor] (hereinafter called "the Contractor") has Undertaken, in pursuance of Contract No. \_\_\_\_\_ dated \_\_\_\_\_ to execute \_\_\_\_\_ [name of Contract and brief description of Works] (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with its obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of \_\_\_\_\_ [amount of Guarantee] \_\_\_\_\_ [in words], such sum Being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of \_\_\_\_\_ [amount of Guarantee] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until the date of issue of the Performance Certificate.

Signature and Seal of the Guarantor \_\_\_\_\_  
Name of Bank \_\_\_\_\_  
Address \_\_\_\_\_  
Date \_\_\_\_\_

## SECTION 8 – SCHEDULE OF PRICES

### 8.1 SCHEDULE OF PRICES & CONDITIONS OF PAYMENT

#### 8.1.1 Contract Price

The Contract Price is comprehensive in that, in consideration of the Contractor meeting all obligations, conditions and liabilities under the Contract, including the Contractor's allowance for the cost of supply of all labor, materials, plant, supervision required to complete the Contract Works, overheads and profit, subject only such adjustment as is provided for the Contract.

#### 8.1.2 Basis of Schedules

Descriptions of various items contained in the Schedule of Prices are intended to be a complete definition of the scope of the Contract Works, for which reference shall be made to the Specification, Drawings, Basis of Payments and other Contract Documents. The items descriptions on the Schedule of Prices shall be used only for the purpose of calculating progress payments and for valuing variations.

#### 8.1.3 Basis of Payments

The rate or cost of the items shall represent the total cost of designing (where appropriate), checking, approving, purchasing, constructing, installing, commissioning, training the Employer's staff, testing and providing as-built drawings and O&M manuals for the works unless separate items have been included for some of these activities.

#### 8.1.4 Payment Terms

All payments shall be due and payable by the Employer in accordance with the payments terms detailed below. The payments shall be made on completion of milestones as identified and agreed by both the Employer's Representative and the Contractor. The payments will be made based on the following schedule or as agreed in the contract otherwise.

|    | <b>Particulars</b>         | <b>Milestone</b>  | <b>Payment (% of contract price)</b> |
|----|----------------------------|---|--------------------------------------|
| 1. | Design Review              | Upon completion of Design Review and approval by EFL                            | 20%                                  |
| 2. | Factory Acceptance Testing | Upon completion of Factory Acceptance testing and signing off by both parties   | 20%                                  |
| 3. | Shipment                   | Completion of Manufacturing and Shipment supported by bill of lading            | 10%                                  |
| 4. | Delivery                   | Delivery of Equipment to site with defects                                      | 10%                                  |
| 5. | Commissioning              | Upon commissioning of plant with defects and issuing of performance certificate | 30%                                  |
| 6. | Retention                  | 12 months after issuing of performance certificate                              | 10%                                  |

All work performed on-shore by the contractor is liable for taxation under the laws of Fiji. If the contractor is not a registered entity in Fiji, then a withholding tax of 15% will be levied by the Government of Fiji on all work carried out by the contractor related to installation and commissioning in Fiji. This amount will be deducted from the outward payments being made to the contractor. Note that this will not be levied on the design, manufacture or supply of any plant or equipment.

### 8.2 SCHEDULES OF RATES & PRICES

#### 8.2.1 Notes on Schedules of Rates and Prices

The Schedules are divided into separate sections as follows:

- 8.2.2 Price Schedule of Main Items
- 8.2.3 Alternative Offers
- 8.2.4 Recommended Tools & Spare Parts
- 8.2.5 Summary of Prices
- 8.2.6 Tenderers Tools & Equipment
- 8.2.7 Rate of Variations

The quantities shown in these schedules are estimates only. The Schedules do not generally give a full description of the plant and equipment to be supplied and the services to be performed under each item. Tenderers shall be deemed to have read the Employer's Requirements and other sections of the tender documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rate and prices shall be deemed to include for the full scope as aforesaid including overheads and profit.

Tender prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to tender in the tender documents. For each item, tenderer shall complete each appropriate column in the respective schedules, giving the price breakdown as indicated.

Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in the Employer's Requirements, Drawings or elsewhere in the tender documents. Items left blank will be deemed to have been included in other items.

These schedules are intended primarily to provide information for bid evaluation but not intended to be used for the evaluation of work done for the purpose of interim payment. They may however, be used as a reference for the adjustment of the Schedule of Payment should the need arise.

These schedules can also be used as a basis to value variations of work done under the Proposal Sum.

### 8.2.2 Price Schedule on Main Items

| Item No. | Description   | Estimate Quantity                                       | OFFSHORE COMPONENT<br>CFR FIJI<br>USD/AUD/NZD/ Euro |        | LOCAL COMPONENT<br>FJD |        |
|----------|---|---|---|--------|------------------------|--------|
|          |   |   | Unit Rate   | Amount | Unit Rate              | Amount |
| 1.       | Transformer Circuit Breaker, 3000A, 145 kV, 40 kA, SF6 (consisting of 3 x ganged circuit breaker units complete with operating mechanism) with Trip circuit supervision relays  | 1   |   |        |                        |        |
| 2.       | Steel Support Structures for circuit breakers for gang pole circuit breaker   | 1 set   |   |        |                        |        |
| 3.       | Compression Palms for Ursula Conductor of appropriate type  | 12  |   |        |                        |        |
| 4.       | 1000 pieces of M12 x 75 Stainless Steel full thread bolts and nuts with 2000 pieces of stainless steel conical spring washer 316 grade.   | As required   |   |        |                        |        |
| 5.       | Construction of Pad with required number of M30 Galvanized Studs  | 1   |   |        |                        |        |
| 6.       | Supply, installation of control cables and control wiring accessories   | As required<br>(contractor to verify during site visit) |   |        |                        |        |
| 7.       | Removal of existing circuit breaker, HV cables and associated control wiring works.   | 1   |   |        |                        |        |
| 8.       | Installation, testing and Commissioning of Circuit Breaker  | As required   |   |        |                        |        |
| 9.       | Installation and commissioning of the online monitoring system  | 1 unit  |   |        |                        |        |
| 10.      | Factory Engineer for commissioning of Circuit Breaker   | As required   |   |        |                        |        |
| 11.      | Factory Acceptance Testing (including accommodation, meals, airfare and other transportation for FAT testing) for 2 EFL representative Engineers for 145kV Circuit Breaker  | As required   |   |        |                        |        |
| 12.      | Comprehensive training on the installation, testing, commission and operation & maintenance of the gang pole and single circuit breaker by the manufacturer   | As required   |   |        |                        |        |
| 13.      | Supply of required tool and equipment for installation and commissioning of the switchgear including Milwaukee 10T Knockout Tool Kit with punch and die set (M16-M63)   | As required   |   |        |                        |        |
| 14.      | Supply of the following spares for the gang pole circuit breaker beside the manufacturers recommended spares (2 units of complete operating mechanism/ control Cabinet, 4 unit of spring charge motors, 6 unit of trip coil, 6 units of closing coil)                             | 1 set   |   |        |                        |        |
| 15.      | Line Circuit Breaker, 3000A, 145 kV, 40 kA, SF6 (consisting of 3 x single pole circuit breaker units complete with operating mechanism) with Trip circuit supervision relays  | 1   |   |        |                        |        |
| 16.      | Steel Support Structures for circuit breakers   | 1 set   |   |        |                        |        |
| 17.      | Supply of the following spares for the single pole circuit breaker beside the manufacturers recommended spares (2 units of complete operating mechanism for all 3 phases, 2 unit of control cabinet 4 unit of spring charge motors, 6 unit of trip coil, 6 units of closing coil) | 1 set   |   |        |                        |        |
| 18.      | Others  |   |   |        |                        |        |
|          | <b>TOTAL</b>  |   |   |        |                        |        |

Note:

- The Employer reserves the right to exclude any items at his discretion at awarding, contract or after contract signing. Total price shall be adjusted accordingly.

### 8.2.3 Tools and Equipment

The bidder shall ensure the specialized tools and testing equipment for commissioning are available.

### 8.2.4 Recommended Tools and Spare Parts

As per clause 1.10 of the technical specifications, the tenderer is required to provide a list of spare parts as recommended by the Manufacturer. These shall be divided into two categories i.e. Mandatory and Optional. Thus the bidders are required to provide two separate tables for the two categories. This list shall exclude the list of spare provided by EFL.

| Item | Description | Qty | Unit Price |     | Total Price |     |
|------|-------------|-----|------------|-----|-------------|-----|
|      |             |     | F/C        | FJD | F/C         | FJD |
|      |             |     |            |     |             |     |
|      |             |     |            |     |             |     |
|      |             |     |            |     |             |     |
|      |             |     |            |     |             |     |

**8.2.5 Summary of Prices**

|   | Foreign Cost | Local Cost |
|---|--------------|------------|
| 1. MAIN OFFER:<br>(a) Supply, Install and commission 145kV Gang Pole Circuit Breaker<br>(b) Supply of Single Pole 145kV Circuit Breaker |              |            |
| 2. ALTERNATIVE OFFERS: (Briefly describe)<br>A.   |              |            |
|   |              |            |

**TOTAL CONTRACT PRICE:**

Main Offer: Foreign Currency (in words)

.....

and Local Currency (in words)

.....

\*Alternative A: Foreign Currency (in words)

.....

and Local Currency(in words)

.....

\*Alternative B: Foreign Currency (in words)

.....

and Local Currency (in words)

.....

Signature of Tenderer .....

Witness .....

Note: Details to be included in Part II of this Section in the Departures from Specifications.

**8.2.6 Tenderer's Tools and Equipment's**

During the pre-commissioning and commissioning tests, a lot of specialized tools and equipment will be required to carry out the acceptance testing. Thus the bidders shall provide a list of such tools and equipment that they currently have. These are the tools which will be used for commissioning switchgears, transformers, cables, etc.

| Item No. | Description | Model No. | Manufacturer |
|----------|-------------|-----------|--------------|
|          |             |           |              |

**8.2.7 Rates for Variation**

The Contractor shall aim to carry out the project without any variations. However, if unforeseen circumstances and event warrant any variation, the Contractor shall only proceed with a written approval from the Employer's Representative. The agreed price variation shall be documented.

The rates stated in this schedule shall be applicable to variations ordered by the Employer's Representative and not covered by the Schedule of Prices. These rates shall be deemed to include the cost of construction facilities, professional and technical services, royalties, taxes, transport of equipment, labor and other changes necessary to perform the work.

The Contractor shall not be entitled to any allowance above unit rates stated in the schedule by reason of any amount of work being required under such items during the currency of the Contract.

**8.2.7.1 Materials**

Materials required for variations or day work shall be paid for on the basis of the net quantities actually used in accordance with the Employer's Representatives. Payment will be at the cost on site based on evidence of purchased prices after deductions of all trade and bulk discounts, transport, and any other charges applicable to the materials plus the percentage stated below to cover contractor's profit and overheads. Materials supplied by the Contractor will be at prices to be agreed, due regard being paid to the prices for similar materials if supplied from outside sources.

**8.2.7.2 Labor**

Payment of labor shall be in accordance with the table of hourly rates below which shall include Contractor's profit, overheads, superintendence, time keeping and all clerical and office work and use of hand operated tools and all incidental chargers whatsoever. The time of technicians or leading hands working with the crews will be paid for at rates stated but the time of the supervisors and foremen shall be covered by the overhead component of the hourly rates.

| Item No. | Grade of Officer/Workman | Rate/hour<br>F/C | Rate/hour<br>FJD |
|----------|--------------------------|------------------|------------------|
|          |                          |                  |                  |

## SECTION 8 – EVALUATION CRITERIA

The following criteria with corresponding scoring and weightings which will be utilised for evaluating the bids forms the Technical Evaluation Section. Those bids which score above 92% for the Technical Evaluation will be considered for further evaluation to their financial proposals.

|   | <i>Criteria for Evaluation</i>   | <i>Weighting</i> | <i>Score Range</i>  |  |   |
|---|--|------------------|---|--|---|
|   |  |                  | <i>10 - 7</i>   | <i>7 - 4</i>   | <i>4 - 0</i>  |
| 1 | Manufacturer's years of experience in production of 33kV Switchgear        | 5.00             | Company has more than 50 years experience                     | Company has 20- 50 years experience                                  | Company has 10 - 20 years experience                        |
| 3 | Number of years the offered model has been in production and in the market | 7.50             | Model has been in the market for more than 15 years           | Model has been in the market for 15 - 12 years                       | Model has been in the market for 3 - 10 years               |
| 4 | Number of units of offered model sold in Pacific - Fiji/NZ/Australia       | 2.50             | More than 500   | Less than 500  | Less than 250   |
| 5 | Number of years of experience of key personnel to be involved in project   | 5.00             | More than 10 years for most of the key personnel              | Less than 10 years for most of the key personnel                     | Less than 5 years for most of the key personnel             |
| 6 | Manufacturer's Warranty on Switchgear                                      | 5.00             | More than 2 years   | 1 - 2 years  | Less than 1 year  |
| 7 | Type test reports on Switchgear  | 5.00             | Results meet and exceed the requirements as per IEC standards | Results do not meet minimum specifications                           | Type test reports not submitted or not as per IEC standards |
| 8 | Conformance to acceptable values for routine tests as specified in tender  | 2.50             | Submits evidence that switchgear will conform to and exceed   | Evidence of switchgear will conform to most of the test requirements | No evidence of conformance to test requirements             |



|    |   |       |  |   |   |
|----|---|-------|--|---|---|
| 9  | Comprehensiveness of proposed design    | 2.50  | All the design details are addressed as that would be expected in an ideal proposal.                               | Relevant design details are addressed in terms of design as that compared to an ideal proposal. The proposal conforms to most of the items stated in the specifications | Extent of consideration placed into design is significantly less than that expected in a reasonable proposal. Most of the items stated in specifications are not met. |
| 10 | Nominal Circuit Breaker parameters      | 20.00 | Circuit breaker parameters exceed the nominal required performance ratings   | Circuit breaker parameters are equal to the nominal required performance ratings  | Circuit breaker parameters are below the nominal required performance ratings   |
| 11 | Maintenance Requirements for Switchgear | 15.00 | Needs maintenance every 10 years or more or after 5000 operations  | Needs Maintenance every 5 - 10 years  | Needs Maintenance every 1 - 5 year  |
| 14 | Safety Requirements for Switchgear      | 5.00  | Meets and exceeds the safety requirements of the switchgear, with added consideration to safe design and operation | Meets most of the safety requirements for the switchgear  | Does not meet the level of safety features for the switchgear   |
| 15 | Innovation in Design                    | 15    | High degree of innovation incorporated into design compared to similar products in market                          | Evidence of some innovation incorporated into design  | No evidence showing any innovation in design  |
| 16 | Delivery period and timeline            | 10.00 | Delivery period is within 1 year   | Delivery period is greater than 1 year  | Delivery period would exceed 1 year 6 months  |

|    |                 |      |  |   |   |
|----|-----------------|------|--|---|---|
| 18 | Quality Control | 5.00 | Manufacturer has quality system in accordance with international standards and produced evidence of regular third party audits | Manufacturer appears to have a quality system in place. | Manufacturer has a record of providing reasonable quality material but provides no evidence of a quality system |
|----|-----------------|------|--|---|---|

## TENDER CHECKLIST

***The Bidders must ensure that the details and documentation mention below must be submitted as part of their tender Bid***

Tender Number \_\_\_\_\_

Tender Name \_\_\_\_\_

1. Full Company / Business Name: \_\_\_\_\_

**(Attach copy of Registration Certificate)**

2. Director/Owner(s): \_\_\_\_\_

3. Postal Address: \_\_\_\_\_

4. Phone Contact: \_\_\_\_\_

5. Fax Number: \_\_\_\_\_

6. Email address: \_\_\_\_\_

7. Office Location: \_\_\_\_\_

8. TIN Number: \_\_\_\_\_

**(Attach copy of the VAT/TIN Registration Certificate - Local Bidders Only (Mandatory))**

9. FNPF Employer Registration Number: \_\_\_\_\_ **(For Local Bidders only) (Mandatory)**

10. **Provide a copy of Valid FNPF Compliance Certificate (Mandatory- Local Bidders only)**

11. **Provide a copy of Valid FRCS (Tax) Compliance Certificate (Mandatory Local Bidders only)**

12. **Provide a copy of Valid FNU Compliance Certificate (Mandatory Local Bidders only)**

13. Contact Person: \_\_\_\_\_

I declare that all the above information is correct.

Name: \_\_\_\_\_

Position: \_\_\_\_\_

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

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

## **Tender submission**

Bidders are requested to upload electronic copies via Tender Link by registering their interest at:  
<https://www.tenderlink.com/efl>

**EFL will not accept any hard copy submission to be dropped in the tender box at EFL Head Office in Suva.**

**This tender closes at 4.00pm (1600hrs) on Wednesday 17<sup>th</sup> July, 2024.**

For further information or clarification please contact our Supply Chain Office on phone **(+679) 3224360** or **(+679) 9992400** or email us on [tenders@efl.com.fj](mailto:tenders@efl.com.fj)

**The bidders must ensure that their bid is inclusive of all Taxes payable under Fiji Income Tax Act. Bidders are to clearly state the percentage of VAT that is applicable to the bid prices.**

The lowest bid will not necessarily be accepted as the successful bid.

**The Tender Bids particularly the “Price” must be typed and not hand written.**

**Any request for the extension of the closing date must be addressed to EFL in writing three (3) working days prior to the tender closing date.**

**Tender Submission via email or fax will not be accepted.**