MR 219/2025

DESIGN, MANUFACTURE, TEST, SUPPLY, INSTALLATION AND COMMISSIONING OF 2 x 33kV SWITCHGEAR TO EXTEND ABB ZS3.2 SWITCHBOARD AT OLD KINOYA SUBSTATION

ENERGY FIJI LIMITED

INVITATION FOR BIDS

Date	:	MR 219 2025
Tender No	:	MR 219/2025

Energy Fiji Limited ("the Employer") invites sealed bids from reputable companies to complete **Design, Manufacture, Test, Supply, Shipping & Transportation to Site, Installation and Commissioning 2 X 33kV Switchgear to extend ABB ZS3.2 Switchboard at Old Kinoya Substation.**

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

Bidders may obtain further information from, inspect and acquire the bidding documents and, if required, arrange for a site visit from

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2 Marlow Street, Suva
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Site visit at Old Kinoya Substation is scheduled at **1000hrs on Wednesday, 2nd July, 2025. Contractors may also contact the supply chain office to arrange for the site visit on any other day prior to the closing of the tender.**

Deadline for submission of tenders shall be **1600 hours local Fiji Time on Wednesday, 16th July, 2025.**

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

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Section 1 - Instruction to Bidders

A. General

1. Scope of Bid

1.1 Energy Fiji Limited (hereinafter referred to as "the Employer"), wishes to receive bids for **Design, Manufacture, Test, Supply, Shipping & Transportation to Site, Installation and Commissioning 2 X 33kV Switchgear to extend ABB ZS3.2 Switchboard at Old Kinoya Substation**. As defined in these bidding documents (hereinafter referred to as "the Works").

1.2 The successful bidder will be expected to complete the Works **within 12 months from the date of commencement** of the works which is the date of contract sign-off. Should the manufacture and testing of the switchgear be completed earlier than the site being ready, EFL will require the supplier to safely store the switchgear at their premises. Such storage shall be provided at no additional cost to EFL.

2. Source of Funds

2.1 Energy Fiji Limited has a capital works program which is customer-funded and it intends to use part of the funds for the contract ("the Contract") for which this Invitation to Bid is issued.

3. Eligible Bidders

3.1 This Invitation to Bid is open to Switchgear manufacturers, or an installation contractor preferred by a reputable manufacturer with written approval.

3.2 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer as the Employer shall reasonably request.

3.3 Bidders shall not be under a declaration of ineligibility for corrupt or fraudulent.

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.

Asbestos materials, materials or insulants containing PCB's, or other materials prohibited by the Fiji Laws shall not be used in the construction of the switchgear or instrument transformers.

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 Bidder

5.1 To be qualified for award of Contract, bidders shall:

(a) submit a written power of attorney authorizing the signatory of the bid to commit the bidder; and

(b) Specify joint venture memberships, certification and qualification as equipment manufacturer and subcontractor, 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 bidder's capability to complete the works in accordance with the specifications and the time for completion.

5.2 Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements:

(a) the bid, and in case of a successful bid, the Form of Contract Agreement, shall be signed so as to be legally binding on all partners;

(b) one of the partners shall be authorized to be in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;

(c) The partner in charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture and the entire execution of the Contract. All contract payments to be made by the Employer will be remitted to the authorized partner in charge, and it shall be their responsibility to disburse the payments to the other partners;

(d) all partners of the joint venture shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Bid Form and the Form of Contract Agreement (in case of a successful bid); and

(e) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid.

5.3 Bidders shall also submit proposals of work methods and schedule in sufficient detail to demonstrate the adequacy of the bidders' 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 bidder shall submit only one bid either by itself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid will cause all those bids to be rejected.

7. Cost of Bidding

7.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs.

B. Bidding Documents

8. Content of Bidding Documents

8.1 The bidding documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause 11:

Section	Invitation for Bids
1	Instructions to Bidders
2	Part I - General Conditions
3	Part II - Conditions of Particular Application
4	Employer's Requirements
5	Forms of Proposals and Appendices
6	Sample Forms
7	Schedules
8	Appendices

8.2 The bidder is expected to examine carefully the contents of the Bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Pursuant to Clause 29, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

9. Clarification of Bidding Documents

9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing via email indicated in the Invitation for Bids. Copies of the Employer's response, including a description of the inquiry, will be forwarded to all Employers of the bidding documents.

10. Amendment of Bidding Documents

10.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be part of the bidding documents pursuant to Sub-Clause 9.1, and shall be communicated in writing to all Employers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by email to the Employer.

10.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids, in accordance with Clause 23.

C. Preparation of Bids

11. Language of Bid

11.1 The bid, and all correspondence and documents related to the bid, exchanged between the bidder and the Employer shall be written in the **English language only.**

12. Documents Comprising the Bid

12.1 The bid submitted by the bidder shall comprise of a single file containing tender proposal.

12.2 The technical proposal shall contain the following:

i. Form of Tender and Appendix to Tender;
ii. Power of Attorney;
iii. Information on Qualification;
iv. Confirmation of Eligibility;
v. Schedules of Prices:
vi. Schedule of Major Items of Equipment;
vii. Schedule of Manufacturers, Place of Manufacture and Testing
viii. Schedule of Technical Particulars & Guarantees
ix. Schedule of Times for Delivery & Completion and Contract Completion Duration
x. Schedule for Departures from Specification
xi. Schedule of Manufacturers Statement of Experience
xii. Schedule of Contractors Health & Safety Plan
xiii. Schedule of Other Documents and Drawings to be submitted with the bid
xiv. Any other materials required to be completed and submitted by bidders in accordance with these Instructions to Bidders.

13. Bid Form and Price Schedules

13.1 The Bidder shall complete the Bid Form and the appropriate Price Schedules furnished in the bidding documents in the manner and detail indicated therein, following the requirements of Clauses 14 and 15.

14. Bid Prices

14.1 Unless specified otherwise in Employer's Requirements, Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding 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 bidding documents, all in accordance with the requirements of the Conditions of Contract.

14.2 Bidders shall give a breakdown of the prices in the manner and detail called for in the Schedules of Prices.

14.3 In the Schedules, Bidders shall give the required details and a breakdown of their prices, including all taxes, With Holding Tax, 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:

(a) Design including all necessary drawings and documentation for the Work.

(b) Plant and equipment to be supplied from outside the Employer's country shall be quoted on a **CFR to Site**. In addition, estimated ocean freight charges, local transport, insurance, installation charges, and import duties and taxes shall also be indicated separately in foreign currency and in local currency.

(c) Installation work and Other Services shall be quoted separately and shall include contractor's equipment, temporary works (visa), materials, consumables and all matters and things of whatsoever nature, including local transportation, operations and maintenance services, the provision of operations and maintenance manuals, training, etc. where identified In the bidding documents, as necessary for the proper execution of the Installation and Other Services.

(d) Recommended spare parts shall be quoted separately as specified in either subparagraph (b) or (c) above in accordance with the origin of the spare parts.

(e) Tenderers are strongly advised to check with the Fiji Islands Revenue and Customs Service, Ratu Sukuna Road, Suva regarding income tax, With Holding Tax and corporate tax which may become payable in Fiji, and to make particular note of arrangements and procedures which are necessary because of the existence or non- existence of taxation agreements between Fiji and other countries. Tel No. (679) 3301551 Fax No. (679) 3315537

14.4 The term **CFR** shall be governed by the rules prescribed in the current edition of "Incoterms", published by the International Chamber of Commerce, Paris.

14.5 Prices quoted by the bidder shall be on a fixed lump sum basis with no forex exchange variation and shall not be adjusted for changes in the cost of labour, material or other matters except only for changes in legislation in accordance to Sub-Clause 13.16 of the General Conditions of Contract.

15. Bid Currencies

15.1 Prices shall be quoted in the following currencies:

(a) the prices shall be quoted in the Fijian currency and either in the currency of the bidder's home country, or in US, EURO, Australian and New Zealand Dollars only:

(b) a bidder 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.

15.2 Bidders shall not indicate there any foreign currency requirements in the Appendix to Price Proposal as the price is fixed lump sum.

15.3 Bidders 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 Price Proposal 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.

16. Bid Validity	16.1	Bids shall remain valid for a period of **180 days** after the date of opening of technical proposals specified in Sub-Clause 26.1.
	16.2	In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing via email. A bidder may refuse the request without forfeiting its bid security. A bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to extend the validity of its bid security for the period of the extension, and in compliance with Clause 18 in all respects.
17. Alternative Proposals by Bidders	17.1	Bidders wishing to offer a technical alternative to the Employer's Requirements of the bidding documents must first price the Employer's Requirements as described in the bidding 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 best value for money bidder conforming to the basic technical requirements shall be considered by the Employer.
18. Format and Signing of Bid	18.1	The original and all copies of the bid 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 bid where entries or amendments have been made shall be initialled by the person or persons signing the bid.
	18.2	The bidder shall furnish information as described in the Form of Bid on commission or gratuities, if any, paid or to be paid relating to this Bid, and to Contract execution if the bidder is awarded the Contract.
	D.	**Submission of Bids**
19. Submission of Bids	19.1	Bidders are requested to upload electronic copies via Tender Link by registering their interest at: https://www.tenderlink.com/efl
20. Deadline for Submission of Bids	20.1	Bids must be received by the Employer at the address specified above no later than **1600 hours (Fiji Time) Wednesday, 16th July, 2025.**
	20.2	The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause 9, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadlines extended.
21. Late Bids	21.1	Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 20 will be rejected and returned unopened to the bidder.

22. Modification and Withdrawal of Bids	22.1	The bidder may modify or withdraw its bid after bid submission on the Tenderlink by editing submission.
	22.2	No bid may be modified by the bidder after the deadline for submission of bids, except in accordance with Sub-Clauses 22.1.
	E.	**Bid Opening and Evaluation**
23. Opening of Technical Proposals	23.1	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 Street, Suva, Fiji
24. Process to Be Confidential	24.1	Information relating to the examination, clarification, evaluation and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of the bidder's bid.
25. Clarification of Bids and Contacting the Employer	25.1	To assist in the examination, evaluation and comparison of bids, the Employer may, at its discretion, ask any bidder for clarification of its bid. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the bid 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 27.
	25.2	Subject to Sub-clause 25.1, no bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the Contract is awarded. If the bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.
	25.3	Any effort by the bidder to influence the Employer in the Employer's bid evaluation, bid comparison or Contract award decisions may result in the rejection of the bidder's bid.
26. Preliminary Examination of Bids and Determination of Responsiveness	26.1	Prior to the detailed evaluation of bids, the Employer will determine whether each bid (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 bidding documents; (v) is conforming to Clause 14; and (vi) provides any clarification and/or substantiation that the Employer may require pursuant to Clause 25.
	26.2	A substantially responsive bid is one which conforms to all the terms, conditions and requirements of the bidding documents, without material deviation or reservation. A material deviation of 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 bidding

documents, the Employer's rights or the bidder's obligations under the Contract; or (iii) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

26.3 If a bid 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.

27. Correction of Errors

27.1 Bids 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.

27.2 The amount stated in the Form of Bid 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 bid, its bid will be rejected, and the bid security may be forfeited.

28. Conversion to Single Currency

28.1 The Employer will convert the amounts in various currencies in which the Bid 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 bids.

29. Evaluation and Comparison of Bid

29.1 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 26.

29.2 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 29.4.

29.3 The Employer will carry out a detailed evaluation of the bids in order to determine whether the bidders confirm to meet the prequalification requirements and whether the bids are substantially responsive to the requirements set forth in the bidding documents. In order to reach such a determination, the Employer will examine the information supplied by the Bidders and other requirements in the bidding documents, taking into account the following factors.

(a) Qualification

(i) the determination will take into account the Bidder's updated financial, technical and production capabilities and past performance; it will be based upon an examination of the documentary evidence submitted by the Bidder, pursuant to Sub-Clause 5.1(b), as well as such other information as the Employer deems necessary and appropriate; and

(ii) An affirmative determination will be a prerequisite for the Employer to continue with the evaluation of the bid; a negative determination will result in rejection of bid.

(b) **Technical**

(i) overall completeness and compliance with the Employer's Requirements; the technical merits of plant and equipment offered and deviations from the Employer's Requirements; suitability of the facilities offered in relation to the environmental and climatic conditions prevailing at the site; quality, function and operation of any process control concept included in the bid;

(ii) achievement of specified performance criteria by the facilities;

(iii) type, quantity and long-term availability of spare parts and maintenance services;

(c) **Commercial**

(i) the cost of all quantifiable deviation and omissions from the contractual and commercial conditions and the Employer's Requirements as identified in the bid, and other deviations and omissions not so identified;

(ii) compliance with the time schedule called for in Appendix to Bid and evidenced as needed milestone schedule provided in the bid;

(iii) The functional guarantees of the facilities offered; and

(iv) The extra cost of work, services, facilities etc., required to be provided by the Employer or their parties.

29.4 Pursuant to Sub-Clause 29.3, 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 bidding document. The Employer will make its own assessment of the cost of any deviations for the purpose of ensuring fair comparison of bids.

(b) **Time Schedule:** The plant and equipment covered by this bidding are required to be shipped, installed and the facilities completed within the period specified in Sub-Clause 1.2 and the Appendix to the Bid.

Bidders 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) Bidders 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 bids 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 bidding 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 bid price for evaluation.

29.5 (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 Bid Price". Bid prices quoted by Bidders 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 bidding documents or otherwise result in the accrual of unsolicited benefits to the Employer shall not be taken into account in bid 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 bid evaluation.

(d) If the bid of the successful bidder is substantially below the Employer's estimate for the Contract, the Employer may require the bidder 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 36 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

30. Domestic Preference

30.1 No preference shall be given for domestic contractor or joint venture partners.

F. Award of Contract

31. Award

31.1 Subject to Clause 34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the Best Value for Money, provided that such bidder 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.

	31.2	The bidder 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.
32. Employer's Right to Accept any Bid and to Reject any or all Bids	32.1	Notwithstanding Clause 31, the Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the Employer's action.
33. Notification of Award	33.1	Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder by e-mail that its bid 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").
	33.2	The notification of award will constitute the formation of the Contract.
	33.3	Upon the furnishing by the successful bidder of a performance security, the Employer will promptly notify the other bidders that their bids have been unsuccessful
34. Signing of Contract Agreement	34.1	At the same time that he notifies the successful bidder that its bid has been accepted, the Employer will send the bidder the Form of Contract Agreement provided in the bidding documents, incorporating all agreements between the parties.
	34.2	Within 28 days of receipt of the Form of Agreement, the successful bidder shall sign the Form and return it to the Employer.
35. Performance Security	35.1	Within 28 days of receipt of the notification of award from the Employer, the successful bidder 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.
	35.2	Failure of the successful bidder to comply with the requirements of Clauses 34 or 35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security.
36. Corrupt or Fraudulent Practices	36.1	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 behaviour 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;

36.2 Furthermore, bidders shall be aware of the provision stated in Sub-Clause 1.16 and Sub-Clause 15.5 of the Conditions of Contract, Part II - 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 subpara 1.1.1.3 of Sub-Clause 1.1 by adding the following words at the end: "The word 'tender' is synonymous with bid'." Amend subpara 1.1.1.4 of Sub-Clause 1.1 by adding the following words at the end: "The words 'Appendix to Tender' are synonymous with the words 'Appendix to Technical Proposal' and 'Appendix to Price Proposal'." 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 (j) and add the following: (a) the Contract Agreement; (b) the Letter of Acceptance; (c) the Employer's Requirements; (d) the Bid; (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 1.16 Inspections and Audit by the Employer	Add the following sub-clause: "The Contractor shall permit the Employer to inspect the Contractor's accounts and records relating to the performance of the Contract and to have

them audited by auditors appointed by the Employer, if so required by the Employer."

Sub Clause 2.5 Customs and Import Duties

(a) The Contractor shall pay for all customs and import duties including clearing, handling charges, port dues and demurrage except only for Customs and Import duties, VAT in respect of Plant, Switchgear and spare parts to be supplied under the Contract which shall be the responsibility of the Employer.

(b) Customs and import duties if any in respect of the Contractor's Equipment shall be borne by the Contractor.

(c) Notwithstanding Sub Clauses 2.5(a) and 2.5 (b) above, the Contractor shall ensure that all customs and import duties and taxes are paid on time (including making payment for duties and taxes which are the responsibility of the Employer and invoicing the Employer therefor after the fact). For the avoidance of doubt the Contractor shall not be entitled to any extension of time as a result of any delayed payments of import duties and taxes which was within its control.

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 50,000.

(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."

Sub-Clause 4.1 General Obligations	Add the following sentence to precede the existing text under Sub-Clause 4.1: "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."
Sub-Clause 4.2 Performance Security	Replace the first paragraph of Sub-Clause 4.2 with the following: "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 from a commercial bank and not Financial Service Institution, issued either (a) by a bank located in the country of the Employer or a foreign commercial 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."
Sub-Clause 4.3 Contractor's Representative	At the end of Sub-Clause 4.3 add: "The Contractor's Representative must be fluent (both spoken and written) in the English language."
Sub-Clause 4.4 Co-ordination of the Works	Modify the first sentence of Sub-Clause 4.4 to read: "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."
Sub-Clause 4.9 Site Data	Modify the last sentence of paragraph 1 of Sub-Clause 4.9 to read: "The Contractor shall be responsible for interpreting all data including data listed elsewhere in the Contract as open for inspection at EFL, Head Office, Suva, Fiji".
Sub-Clause 4.14 Program	Delete the third sentence of Sub-Clause 4.14 indicated below: "Unless otherwise stated ……. and late finish dates".
Sub-Clause 5.2 Construction Documents	In the fifth line of the second paragraph of sub-clause 5.2 replace "21" with "28". In Sub-Clause 5.2 delete sub-paragraph (a) and substitute: "(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: (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

(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".

Sub-Clause 5.4 Technical Standards & Regulations

Add the following sentence to the end of the Sub-Clause 5.4:

"In respect of technical specifications and standards, IEC (International Electrotechnical Commission based in 3, rue de Varembé, PO Box 131, CH- 1211 Geneva 20, 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".

Sub-Clause 6.7 Health and Safety

To sub-clause 6.7 add the following paragraph:

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 (2017), Electricity Regulations (2019), the EFL "Safety Manual" – Safety Rules and First Aid Requirements.

Sub-Clause 6.8 Contractor's Superintendence

At the end of Sub-Clause 6.8 add:

"All the Contractors superintending staff shall have a working knowledge of the English language."

Sub-Clause 6.11 Foreign staff and Labour

"The Contractor may import such staff, and labourers 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 and the cost of all business visa requirements. 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."

Sub-Clause 6.12 Measures against Insect & Pest Nuisance

"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 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."

Sub-Clause 6.13 Epidemics	"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."
Sub-Clause 6.14 Alcoholic, Liquors or Drug	"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."
Sub-Clause 6.15 Arms and Ammunition	"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."
Sub-Clause 6.16 Burial of the Dead	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. 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.
Sub-Clause 6.17 Festivals and Religious Customs	"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."
Sub-Clause 7.3 Inspection	To sub – clause 7.3 add the following paragraphs: 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. 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.
Sub-Clause 7.7 Restriction on Eligibility	(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. (b) For the purpose of this clause, "services" means the works and all project-related services including design services. (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. (d) The origin of Goods and Services is distinct from the nationality of the Supplier."

Sub-Clause 13.2 Advance Payment	NIL
Sub-Clause 13.15 Calculation of Payments in Foreign Currency	Delete Clause 13.15 and add the following: "The Contract shall be paid in the currencies stated in the Appendix to Bid 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 that: (a) the Contractor shall inform the Employer and the Employer's Representative whenever any such substantial change may occur; or (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	To sub-clause 13.15 add the following paragraph: The local (Fijian) and foreign component of the Contract Price shall not be subjected to any currency exchange rate variation.
Sub-Clause 13.17 Taxation	(i) The prices bid by the Contractor shall include all taxes, duties and other changes 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. (ii) The prices bid by the Contractor shall include all customs duties, import duties, with Holding Tax, business taxes, income and other taxes that may be levied in accordance to the laws and regulations in being as of the date 28 days prior to the closing date for submission of bids in the Employer's country on the Contractor's Equipment, Plant, materials and supplies (permanent, temporary and consumable) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from its responsibility to pay any tax that may be levied in the Employer's country on profits made by it in respect of the Contract. The price shall include With Holding Tax of 15% for the service in Fiji for all overseas portion"
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

(i) 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".

(ii) 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 - Employer's Requirements: Part I – Scope of Works

1.0 GENERAL DESCRIPTION

The Old Kinoya Substation currently has a **36kV ABB ZS3.2 Switchboard with HD4 Circuit Breaker (Withdrawable SF6 Circuit Breaker)**. The current switchboard arrangement has a Bus Bar System with sectionalizer whereby the right hand side bus is denoted as Bus 1 and the left hand side denoted as Bus 2. EFL is planning to upgrade the substation with 2 new 33kV interconnectors. Therefore, EFL is seeking reputable switchgear manufacturers and suppliers to provide identical switchboard or equivalent which can connect to the existing switchboard arrangement.

The scope of works for this contract at Old Kinoya Substation is for complete Design, Manufacture, Test, Supply, Shipping & Transportation to Site, Installation and Commissioning of 33kV Indoor Switchgears. The switchgear to comprise of withdrawable or fixed Switchgears with spring charge operating mechanism, SEL Protection Relays, SCADA Control Relay, Arc Protection Relays, Partial Discharge Monitoring and Sync Check Facility.

Bidder can provide proposal for either one of the following:

Either

1. **2 x ABB Unigear ZS3.2 Panel with 2000A rated Bus with withdrawable HD4 Circuit Breaker.**

   (These panels will be integrated with the existing ABB ZS3.2 switchboard, with one panel connected at each end of the existing arrangement.)

   a. **Spares (to be supplied with ABB Unigear ZS3.2 Panel and 1250A HD4 Circuit Breaker)**

      i. 3 x ABB ESH9 Mechanisms with 6 x opening solenoid, 6 x closing solenoid, 6 x blocking solenoid and 6 x spring charge limit switches
      ii. Indication Lamps (Green, Orange, Red, White) – 20 each
      iii. Earth Switch, Circuit Breaker and Withdrawable Status Indication Lamp – 10 each
      iv. 6 x Spring charge motors
      v. 20 x VT Fuse
      vi. 3 x Local/Remote Switches with Contacts
      vii. 3 x Trip/Close Switches with Contacts
      viii. 3 x Voltage indicators
      ix. 6 x heaters with thermostat
      x. 10 x NEMO HD+ of digital meter

OR (Alternative)

2. **2 x 36kV Switchgears with 2000A rated Bus with 1250A withdrawable or fixed circuit breaker.**

   (Bidder to specify the methodology for connection of the new panel to the existing switchboard)

   a. **Spares (to be supplied with alternative offer)**

      i. 1 x opening solenoid, 1 x closing solenoid, 2 x blocking solenoid if applicable and 1 x spring charge limit switch
      ii. Indication Lamps (Green, Orange, Red, White) – 20 each
      iii. 1 x Spring charge motors
      iv. 3 x Local/Remote Switches with Contacts
      v. 3 x Trip/Close Switches with Contacts
      vi. 1 x heaters with thermostat
      vii. 10 x NEMO HD+ of digital meter

The main items for the supply and installation under the scope includes:

a. 33kV Indoor Switchgear for Old Kinoya Substation will comprise of:

2 Nos. Feeder panel with bus bar

b. Voltage Transformers and Current Transformers for Bus zone, Line Differential and Overcurrent & Earth Fault Protection for each panel.
c. Control, Metering, Monitoring, Synchro scope, SEL Protection Equipment (SEL311L & SEL351S), VAMP Arc Flash Protection, Partial Discharge Monitoring, etc. CB fail, Bus Block and Bus Zone Protection schemes will need to integrated with the existing panels.
d. Spare Parts (Manufacturer recommended)
e. Recommended Tools and Equipment.
f. EFL required Spares
g. Comprehensive Training

2.0 MAJOR PLANT & MATERIAL INCLUDING SPARE PARTS

2.1 Indoor 36kV Switchgear

2 No. 1,250A, 36 kV, 31.5kA, 3 phase circuit breaker complete with HV housing Panel

2 No. Withdrawable Three phase voltage transformers, 30VA ratio 33,000/V3:110/V3:110/V3
Class 0.2 for Metering and Protection with Resistors and VT guard

33 kV Current Transformers with following cores:

2 No. Class 5P20, ratio 1200/800/600:1 for Protection (O/C & earth fault)
2 No. Class 0.1PX, ratio 1200/800/600:1 for Line Differential
2 No. Class 0.1PX, ratio 1200/1000:1 for Bus Zone Protection

2.1.1 Local and Remote Metering

All metering will be carried out via the SEL relays, and additional:

a) Feeder panel where, Current and Circuit Voltage indications shall be provided using NEMO HD+ of digital meter(s).

2.2 33kV Relays

All protection relays shall be SEL with **MMLG02 test blocks.** Arc Flash protection using VAMP 321 Protection. There shall be one unit for each bus bar protection, cable compartment and circuit breaker compartment which shall have

the logic to trip the circuit breaker or the bus bar. It is the bidder's responsibility to install and pre-wire all the relays to the switchgear.

2.2.1 33kV Protection relays

2 Nos	SEL 351S (P/N 0351S7XHB3E1342)
2 Nos	SEL 311L (P/N 0311L7KEE4213542X)
2 Units	VAMP 321 for Arc Flash Protection
2 Units	Partial Discharge Monitoring System including supply and installation for existing panels

2.3 Installation and Other Services

Documented theoretical and on-site practical training on Indoor 33kV Switchgears shall be provided by the supplier as part of the contract.

Basic Contents:

- Installation of switchgears.
- Testing & commissioning of switchgears.
- Carry out primary and secondary injection testing to verify protection schemes and SCADA interfacing and testing.
- Testing of electrical and mechanical interlocking schemes.
- Installation, programming and testing of Arc Flash Protection and partial discharge system for new and existing panels.
- Maintenance practices for the supplied equipment as recommended by the Manufacturer
- Hands on training on test equipment, which are required for maintenance of installed equipment
- Hands on training on periodic adjustment required, and parts replacement procedure in Circuit breaker mechanism.

Section 4- Employer's Requirements: Part II – Technical Specification

3.0 GENERAL INFORMATION

3.1 EXTENT OF CONTRACT

This Contract includes the Design, manufacture, inspecting and testing, insurance, packing of 33kV switchboard for export, shipment to Suva Port, Transportation to Old Kinoya Substation, complete joint erection installation with EFL technicians and Engineers, panel wiring, site testing, pre-commissioning and training of the Plant described herein.

The manufacturer shall be responsible to provide at least One Engineering supervision for installation jointly with EFL to ensure Warranty compliance.

The Contractor shall be responsible for making good for any defective material design or workmanship for a period of **forty eight (48) 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 Contractor's 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.

3.1.1 Quality Requirements

The Contractor shall have a Quality Management System that complies with ISO/AS/NZS 9001, and shall submit evidence of certification.

Documentary evidence shall also be provided on the level of Quality System Certification associated with the supplier and or manufacturer. This documentation shall include the Capability Statement associated with the Quality System Certification.

Tenderers shall be required to submit copies of ISO certification of the workshops or laboratories where the panels will be assembled.

All work undertaken shall be undertaken within the QMS framework.

3.1.2 Occupational Health and Safety Systems

All work shall be undertaken with Occupational Health and Safety certification issued by the local regulatory authority or Ministry of Labour.

In addition to this, tenderers are required to submit copies of certification to occupational health and safety management system, such as AS 4801 or to equivalent international standard (ISO 14001, ISO 45001). Such information is deemed mandatory bid submission and lack of it will result in disqualification of bid.

3.2 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.

3.3 ELECTRICAL DESIGN CRITERIA

3.3.1 System Conditions

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

	System Voltage – 33kV
Normal system voltage	33kV
System Highest voltage	36 kV
Frequency	50 Hz
Earthing of Neutral point	Directly earthed with or without resistor
Design Symmetrical fault level	250 MVA
	31.5 kA

3.3.2 Service Conditions

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

Daily average ambient temperature	32ºC
Max ambient temperature	40ºC
Annual average ambient temperature	30ºC
Minimum ambient temperature	15ºC
Relative Humidity	90%
Altitude	10m
Maximum Wind Speed (under cyclonic conditions)	100m/sec - gusting (under cyclonic conditions)
Isokeraunic Level	100
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.

3.3.3 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

3.3.4 Minimum Clearances

Indoor busbars and connections shall have electrical clearances as listed in IEC Standard.

3.3.5 Pollution levels of Insulators and Bushings

For substations with Heavy pollution level as per table 1 of IEC 60815, Phase to ground:

53.7mm/kV (at max operating voltage of 33kV)

3.3.6 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.

3.3.7 Inter-Changeability

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

3.3.8 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.

3.3.9 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 tropicalised.

3.3.10 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.

3.4 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.

3.5 STANDARDS

IEC Standards are to be adopted in general. British or Australian 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) and Electricity Regulations (2019)

Health and Safety at Work Act – 1996

Environment Management Act

In order to achieve Regulatory compliance under the Electricity Act, the Works shall comply with the Electricity Regulations and the latest version of AS/NZS 3000 "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 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	Protection of structural steel against atmospheric corrosion by the use of protective coatings
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 control gear 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	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	"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 Power Stations
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	General requirements for the competence of testing and calibration laboratories

Institute of Electrical and Electronic Engineers (IEEE)

IEEE C37.110	Guide for the Application of Current 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 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 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 Power Stations
ANSI/IEEE Std 665	Guide for Generating Station Grounding
ANSI/IEEE Std 80	Guide for Safety in AC Power Station 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 EN ISO	1461 Hot dip galvanized coatings on fabricated iron and steel articles
BS 6231	Specification for PVC-insulated cables for switchgear and controlgear wiring BS
6651	Protection of structures against lightning.
BS 7354	Code of Practice for Design of high-voltage open-terminals stations, Section 7: Earthing. BS
7430	Code of Practice for Earthing.

3.6 DETAILED DESIGN OF PLANT AND EQUIPMENT

The detailed design of plant and equipment including plant layout, protection, control, supervisory interface equipment, earthing, etc. shall be carried out by the contractor in accordance with acceptable standards and codes of practice. All designs, calculations and drawings shall be prepared by adequately qualified and skilled personnel and reviewed and approved by Chartered Professional Engineer authorised to practice in the Oceania region.

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 concept design, detailed designs, technical submissions, design, manufacture and construction drawings, etc. for approval at each stage until the completion of the project. Designs shall be prepared using the EFL drawing borders and all drawings and documents shall comply with the EFL drawing numbering system. EFL will issue AutoCAD templates to successful bidder at time of contract award.

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.

3.7 DESIGN REVIEW

EFL will require **two (2)** of their representatives to carry out design reviews with the manufacturer at the manufacture premises where the switchgear is produced and at the same time familiarise with the switchgear in the factory. All associated cost of the transportation, air travel, local travel to and from the Hotel, internet chargers, meals and accommodation shall be provided by the contractor as per United Nations rules and regulations conditions. The cost shall be part of your submissions. Upon completion of the design review, the manufacturer or supplier shall submit soft copies of all design drawings to EFL.

3.8 INSPECTION AND FACTORY ACCEPTANCE 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 **two (2)** of their representatives 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 each plant and instrument transformer and relay purchased. The associated cost must be included in the tender price and paid in per diem as per United Nation Rates to the representatives.

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 panels shall be made available by the Contractor. The contractor to make a list of Test Equipment 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.

The Contractor shall provide all facilities for such tests or inspections to be carried out by the EFL's representatives. All associated cost of the transportation, air travel, local travel to and from the Hotel, internet chargers, meals and accommodation shall be provided by the contractor as per United Nations rules and regulations conditions. The cost shall be part of your submissions.

3.9 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.

3.10 SPARES

The tenderer shall forward a list of manufacturer's mandatory spare parts required for operation and maintenance of the plant and equipment supplied under this contract for a period of 15 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 also submit the price of the spares listed besides the manufacturers mandatory spares.

3.11 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.

Successful contractor shall forward 6 (six) bounded 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 2024 version are required as part of hand over. As built drawings are required to be furnished in 6 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:

3.11.1 Plant Specification and Description

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

3.11.2 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.

3.11.3 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.

3.11.4 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, electrical resistance values, limits of wear, periodic adjustments, material specifications including special procedures (eg, heat treatment), weights of large items, details and uses of special tools, test equipment, jigs, gauges and tightening torque values.

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.

3.12 TYPE TEST CERTIFICATES

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

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.

3.13 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 installation of the plant and equipment to be supplied.

3.14 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.

The contractor must install impact recorders on each panel and inspect with EFL representative on arrival of shipment at Old Kinoya Substation.

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.

3.15 PROGRAMME AND PROGRESS OF WORK

3.15.1 Programme

Within 14 days of acceptance of the Tender the Contractor shall provide the Employer's Representative with two hard copies and one soft copy of the Programme of work covering design, manufacture, delivery and erection.

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.

4.0 SWITCHGEAR

4.1 GENERAL

This part of the Specification covers the design, ratings, testing, shipping, supervision and joint installation and commissioning of factory assembled, type tested 33kV switchgear. Spare parts, if required by the Bidder 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 Bidder, 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.

4.2 Performance, Standards and Codes

The switchgear shall operate satisfactorily within its rated values in the environment specified in Part 1 of this specification. The switchgear is planned to be installed indoors (inside Sub Station building) with a service temperature of +50°C. Routine maintenance to any of its external components, including the protective relays and instrument transformers, shall not be required in less than five year intervals; internal components shall be maintenance-free for at least ten years.

Performance, testing and rating of the switchgear shall conform to the latest edition of all relevant IEC Publications. Bidder's proposing other than the above standards must specifically indicate the standards to which his switchgear conforms, and indicate all deviations (if any) from the above codes that affect performance and rating.

Compliance of the switchgear manufacturer and the Contractor with the provisions of this Specification does not relieve the Contractor of the responsibility of furnishing switchgear and accessories of proper design, electrically and mechanically suited to meet the operating guarantees at the specified service conditions.

The General requirements of the switchgear panels are as outlined in the table below (detailed enquiry data sheet is provided in the schedules for the bidder to fill in.

General Requirements	Description
Rated Voltage and System	33kV, 3 phase, 3 wire, 50Hz
Switchgear Type	Indoor, gas insulated or vacuum, metal-clad, floor mounted. Dead-front, withdrawable or fixed type circuit breakers
Rated Lightning impulse withstand	185kV peak
Rated 1 minute power frequency withstand	70kV rms
Short circuit rms breaking current	31.5kA
Short time current duration	3s
Supply voltage of opening and closing devices and aux circuits	110V DC
Busbar Rating	2000A
Degree of enclosure protection	IP41
Operating mechanism	Spring charge
VAMP321 Arc Flash Protection	Bus bar Protection
With optic fibre	Circuit breaker area protection
Initiates to trip using Overcurrent Relay	

4.3 Design and Construction

4.3.1 Electrical Data and General Requirements

a) Electrical key data as required by this Specification are stated in Schedule of Technical Particulars for main parts of plant and equipment and in the enclosed single line diagram.

b) The switchboard, when installed and operating under the ambient conditions shall perform satisfactorily and safely under all normal and fault conditions. Even repeated operations under full rated fault conditions shall not lead to diminished performance or significantly shortened useful life of the switchgear. Arc faults caused by external reasons shall be positively confined to the originating compartment and shall not spread to any other parts of the switchgear or bus bar.

c) 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.

d) Lightning Impulse withstand capability and power frequency withstand capability for the entire switchboard shall be in accordance with IEC 60694, Table I.

e) The auxiliary voltages as per Part 1 are to be considered for the design, in particular for the Motor control voltage, the Alarm voltage, the Close and trip voltage and the Space heater voltage.

f) The switchgear shall be of the free-standing, self-supporting, dead front design with all high voltage equipment installed inside metallic and earthed enclosures, suitably divided into individual compartments, at least for the

- busbar system(s)
- circuit breaker
- cable connections
- low voltage compartment

g) Partitions between feeder bays or panels are required to avoid fault spreading from one feeder bay or panel to the other one and to the outside.

h) The row(s) of bays or panels shall be earthed through a suitable copper bar, which is to run along the full length of the switchgear, and to be connected to the station earthing, at least at two points.

i) The erection of the switchgear shall not require any cutting, welding or drilling of material on site. Each line-up of switchgear shall be prepared for future extension on either end without any drilling, cutting or welding on the existing equipment.

j) The design shall provide for maximum levels of reliability, ease of operation and maintenance, and maximum flexibility. The possibility of field repairs and exchange of enclosure parts shall be taken into account. The panels shall be constructed identically to ensure that equivalent switchgear parts can be interchanged. Design of the switchgear must allow for the removal of individual breaker bays, or parts thereof, without disturbing the remaining bays. It shall be possible to exchange an entire feeder, with or without its busbar section, without dismantling neighbouring bays.

k) Busbars and their enclosures shall take thermal expansion of the entire switchboard into account. Suitable mounting facilities, bellows and compensators shall be provided where necessary.

l) Supply trolley if existing trolley is not compatible with the new withdrawable circuit breakers.

4.3.2 Safety Requirements

a) The switchgear shall offer a maximum degree of safety for the operators and by-standers under all normal operating and fault conditions. In particular, it must be impossible to unwillingly, i.e. without the use of tools, touch live parts of the switchgear, or perform operations that lead to arcing faults. For mechanical protection of the switchgear elements, panels with a minimum of Protection Class IP41 is required, i.e. enclosed and inaccessible for granular foreign bodies during normal operation and protection against vertically falling water droplets. All high voltage carrying parts shall be totally protected against contact with live parts.

b) Should internal arcing occur, the release of pressurised air or gas by suitable pressure relieve devices into the atmosphere must occur in such a way that personnel standing at the operating position of the switchgear will not be injured. Furthermore, no part of the enclosure or any loose parts may fly off the switchgear in such an event, and no holes may burn through enclosures. All earthing connections must remain operational during and after an arc fault as the circuit breaker or the bus bar shall be isolated via protection to safeguard the plant and equipment.

c) All interlocks (Electrical and mechanical) which prevent potentially dangerous fail-operations must be constructed such, that they cannot be by-passed easily, i.e. the operator must use tools or force to bypass them.

d) Energy storing mechanism of breakers must be totally enclosed with the switchgear in the operating condition.

e) All low voltage terminals remaining "live" after the main feeder has been disconnected shall be wired to particularly marked terminal blocks and shall carry suitable warning tags.

f) Earthing Key box for bus bar for each shall be located with a Joggle chamber and not on the side of the end panels

4.4 Earthing Switches and Earthing Panel

a) Means to safely isolate and ground any feeder in the switchgear shall be provided. Earth switch shall be suitably interlocked electrically and mechanically with the breaker.

b) Isolation shall be designed to withstand the rated and fault current of the largest breaker interrupter element that can be fitted into the switchgear.

c) View-ports or mechanical indicators connected directly and permanently to the operating shaft are required to positively display the actual switch position. Indirect position indicators are not acceptable.

d) Mechanical locking the circuit earth switches using a key switch for earthing each bus bar.

e) Bus bar mechanical locking all CBs using the key switch

4.5 Circuit Breakers

a) SF6 or vacuum circuit breakers with totally enclosed and maintenance-free contact system with spring charge closing.

b) Circuit breakers shall conform to Publication IEC 60056 in terms of rating, testing and performance, but they may conform to the standards of the country of manufacture for construction requirements, provided these standards do not conflict with the corresponding IEC 60056 rules and are acceptable to the Employer's Representative.

c) Each breaker shall be capable of having the following positions in case of withdrawable circuit breakers:
   (i) Normal Service (connected)
   (ii) Disconnected (Isolated)
   (iii) Withdrawn

In the withdrawn position a facility shall be provided for the circuit breaker control and auxiliary circuits to be connected and the breaker to be operated without the main power circuits being connected. This facility shall also inhibit all interacting electrical interlocks to and from other equipment.

d) Breaker operating mechanisms shall be of the stored energy type (spring charge), with provisions for manual operation in case of control power failure. All breakers must be electrically trip-free and have anti pumping circuits..

e) A manually operable local trip push-button (mechanically working onto the trip shaft) shall be available, and all breakers shall be suitable for remote control. Manual, mechanical ON-switching shall be prevented if interlocking condition exists. Mechanical indicators shall be provided to shown the ON/OFF position of the breaker contacts. Operation counters shall be provided.

f) The switchgear shall have an **electrical and mechanical endurance of class E2 and M2** respectively. Replacement of the breaker interrupter must be possible.

g) Spare auxiliary contacts (4 N/O and 4 N/C) shall be provided in addition to those required for breaker operation. These contacts shall be wired to the terminal blocks for use at the LDC terminal cubicles. Additional contacts as required, e.g. for interlocking, shall be provided and incorporated in the control system

h) Rated nominal current of circuit breakers shall be selected to the rated values listed in the schedules in order to reach the required rating, once the breaker is installed inside its enclosure. The feeder nameplate shall indicate the actual site rating of the feeder at maximum ambient temperature in addition to the nominal rating of the breaker.

4.6 Interlocking System

Electrical and mechanical interlocking, which shall at least fulfil the conditions as listed below, shall be provided. The final interlocking scheme shall be proposed by the Contractor and shall be subject to the approval of the Employer's Representative.

a) The interlock system must positively prevent an operator from reaching or creating unintentionally a dangerous or potentially dangerous condition. Systems that can be by-passed without the use of tools and/or force are not acceptable.

b) All necessary electrical interlocks shall be provided as specified and approved by the Employer. Reference is made to the related sections of the High-Voltage switchgear of this Specification.

c) When the manual emergency crank for the breaker is in use, it shall be impossible to control the breaker electrically (provision of limit-switch or de-clutching of the crank).

d) All breakers for remote control shall have a key-operated selector switch, allowing the selection of LOCAL - REMOTE operation modes mounted on the CB control cubicle.

Additionally the following has to be included for safe operation:

- Mechanical interlock preventing the circuit breaker from being racked-in or withdrawn if it is closed.
- Mechanical interlock preventing closing of circuit breaker either manually or electrically at any position between connected and disconnected.
- Mechanical interlock preventing the circuit breaker from being racked-in if the corresponding built-in earthing switch is closed.
- Mechanical interlocks preventing closing of earth switch if the corresponding circuit breaker is in service position.
- Electrical interlock to allow closing of bus earth switch only if all circuit breakers in respective bus section are in open and disconnected position.
- Interlock preventing the closing of circuit breaker if it is Earth Position.
- Interlock to prevent closing of any breaker if bus earth switch is closed.
- Mechanical interlock preventing the manual closing of the circuit breaker unless the secondary circuits plug is connected and secured to the socket and blocking the removal of the plug if circuit breaker is closed.

The following position displays shall be provided for each circuit breaker; visible from outside the panel without opening the doors

CB in Closed Position	–	'ON' to be marked in white lettering on a red background
CB in Open Position	–	'OFF' to be marked in white lettering on a green background
Earth Switch In Open Position	–	‘E/S OPEN’ in black lettering in yellow background
Earth Switch In Closed Position	–	‘E/S CLOSED’ in white lettering in green background

4.7 Enclosures

a) Metal enclosures shall be made from steel or aluminium, offering mechanical and thermal properties suitable for this application. Enclosures shall withstand the full rated fault current during arcing faults without puncturing for at least 1 second or means have to be provided to trip any such fault current prior to puncturing (e.g. busbar protection).

b) In no case shall arcing cause holes in the outer freely accessible sides of the enclosed feeder compartment. Gases and vapours escaping under pressure shall be deflected by front and side covers in a direction such as to minimize the danger to an operator performing his normal operation duty.

c) Assembled enclosures must withstand at least twice their rated internal operating pressure. This fact must be proven on each individual section of the switchgear.

d) Each breaker bay shall consist of at least the following high voltage compartments:
   i. Busbars
   ii. Breakers/Switchgear
   iii. Cable termination compartment
   iv. LV compartment

e) Design of the switchgear must allow for the removal of individual breaker bays, or parts thereof, without disturbing the remaining bays.

f) All operating elements and indicators of the switchgear must be located on, or be visible from the front side of the equipment.

g) For withdrawable type circuit breaker, a set of shutters shall be provided on each busbar and circuit chamber assembly to cover 3-phase group of stationary isolating contacts. The shutters shall open or close automatically by a positive drive coincident with the withdrawal or insertion of the associated circuit breaker. Each set shall be capable of being individually operated and padlocked closed using mechanical bars. When padlocked the shutters shall prevent access to the stationary isolating contacts. To facilitate testing, a device shall be provided for fixing (but not padlocking) the shutters in the open position and subsequently for releasing them to the closed position. This device shall be designed so as to be cancelled by the moving portion, to ensure restoration of the automatic features of the shutters. For fixed type circuit breaker, provision has to be made for accessing of the busbar and circuit for testing

h) Shall be fully arc protected to IEC standards using VAMP321.

i) Withdrawable circuit breakers shall have provisions for closed-door mechanical operation (mechanical open and close of the circuit breaker shall be done with the door closed to maintain the arc fault protection rating).

j) For GIS enclosures with AIS bus bar similar approach for the fixed type panels.

4.8 BUSBARS

a) The fully enclosed busbars shall be made from electrolytic drawn copper. They shall be rated for the continuous current of the switchgear under the site conditions and shall be braced for the maximum peak short circuit current or the minimum of 2.5 times the rated symmetrical short circuit current whichever is higher. Busbars and connection shall be fully insulated for working voltage with adequate

phase/ground clearances. All busbars shall be insulated. All joints and tap-offs shall be poured with cast resin or be provided with mandatory removable shrouds.

b) The busbars shall be air insulated completely enclosed in an earthed metal chamber. If removable panels are fitted to give access to the busbar chamber, the removal of these panels shall not give access to any incoming or outgoing circuits, which may be electrically energised from their remote ends.

c) The busbars shall be so constructed that it shall be provision to extend the switchboard at either end by adding further panels.

d) Partitions shall be provided to divide the switchboard busbars into panel compartments to prevent the passage of fault producing ionised gasses.

e) Bus bar chamber and the switchgear panels shall be vermin and rodent proof adequately to prevent against ingress of moisture and dust.

4.9 Instrument Transformers

a) All instrument transformers must be suitable for continuous operation for 20 % overload when installed in the switchgear under the ambient site conditions and for service under all rated and fault conditions. The Contractor shall submit design calculations for instrument transformer sizing for approval.

b) Accuracy classes and burdens shall be in accordance with IEC 61869, IEC 60186 and schedules of the tender document for current- and voltage-transformers.

c) Cores for measuring instruments shall have accuracy classes of not less than 0.2 % and saturation factors below 5, cores for relaying shall have accuracies better than 5 % and saturation factors of more than 20.

d) Current transformer ratios (secondary side) shall be as indicated in the Schedule B of this Tender.

e) Current transformers must have shorting type secondary terminals. The current transformer-rating plate and the terminals must be accessible after power cables have been installed.

f) Current transformers of the epoxy type, mounted inside the high voltage enclosure on ground potential are preferred; other designs require the approval of Employer's Representative.

g) Potential transformers must be able to withstand the full rated power frequency withstand and lightning impulse capability.

h) Potential transformers for busbar metering shall be of the inductive type, mounted on the bus coupler/sectionalizer switchgear bay panel or at the end of the busbars. The ratio shall be as per single line diagram, the rated burden suitable for the measuring and metering equipment connected, however, with a maximum of 100 VA.

i) The potential transformer shall be of the metal-enclosed, gas-insulated type, dry type or approved equal.

j) Potential transformers on the line side of incoming feeders or the load side of outgoing feeders shall be of the inductive type, suitable for the measuring and metering equipment connected to it. They may be mounted at or within the cable connection compartment.

k) All voltage transformers to be provided with an identification label giving Manufacturer, Address, type, ratio, class, output, burden serial number, EFL contract number, frequency, rated IL, rated voltage factor, and the IEC/AS/BS standard number.

l) All current transformers to be provided with an identification label giving Manufacturer, Address, type, ratio, class, Winding Resistance, burden, serial number, EFL contract number, frequency, rated IL, rated voltage factor, and the IEC/AS/BS standard number. Magnetisation curves for all current transformer to be supplied with the equipment.

m) ALL potential transformers shall have protection devised fuse cut outs and resistors to cover for the Ferro resonance.

n) All potential transformers shall have provision to be isolated on the HV side.

4.10 Auxiliary Switches

a) Auxiliary switches in addition to those required for the control of the circuit breaker shall be supplied to control circuits with spare contacts. Four of these spare circuits shall close when the circuit breaker closes and the other four shall close when the circuit breaker opens.

b) The drum type of switch with wiping contacts is preferred but the type offered shall be capable of adjustment relative to the operating position of the circuit breaker. Contacts shall be rated to withstand 120V 10A D.C. continuously.

4.11 Operation Counter

a) Each circuit breaker shall be fitted with an operation counter actuated from the mechanism. The counter reading shall be clearly visible to enable readings to be taken without opening the panel doors.

4.12 Isolating Contact for Auxiliary Circuits

a) The connections in the auxiliary circuits between the fixed and moving portions of the equipment shall be by means of either self-aligning plugs and sockets or a flexible interconnecting harness.

4.13 Interchangeability

a) Circuit breakers of a particular current rating shall be completely interchangeable with others of the same and different rating.

4.14 CONTROL AND INDICATION

4.14.1 Circuit Breaker Control

a) Circuit Breaker shall be electrically controlled from the following control points.

i. **Local Control** - Located adjacent to the item of plant to facilitate maintenance, test operation and emergency operation on feeder panels only.

ii. **Remote/Supervisory Control** - Located at National Control Centre where principal items of the systems are monitored and remotely controlled by SCADA system DNP3.0 and IEC 61850 system.

b) Note: All external interlocks and remote indications are defeated in the "test" operation.

4.14.2 Control Switches and Pushbuttons

a) 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.

b) 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.

c) Remotely controlled breakers shall have key-operated selector switches installed in their low voltage compartment with the following functions. The key shall be removable in a "remote" position only.

The switch shall have these positions/functions:

LOCAL : The breaker can only be operated locally by its push-buttons or mechanically.

REMOTE : The breaker can only be operated from the remote control room location.

Provision of protection trip wiring shall be provided directly to the trip circuit from the protection relay.

4.14.3 Indicating Lamps (LEDs) and Fittings

a) Indicating lamps fitted into the facial of switch and instrument cubicles or panels shall be adequately ventilated.

b) All Indicating lamps should be of LIGHT EMITTING DIODE with low wattage.

c) Lamps shall be easily removed and replaced from the front of the panel by manual means not requiring the use of extractors. The bezel of metal or other approved materials holding the lamp glass shall be easily removable from the body of the fitting so as to permit access to the lamp and lamp glass.

d) The lamps shall be clear and must fit into an accepted standard form of lamp holder. The rated lamp voltages should be 25 percent in excess of the auxiliary supply voltage.

e) The lamp glasses shall be in standard colours, red, green, white and amber. The colour shall be in the glass and the different coloured glasses shall be interchangeable. Transparent synthetic materials may be used instead of glass, provided such materials have fast colours and are completely suitable for use in tropical climate.

4.15 Earthing

a) The switchboard shall be fitted with a copper earth bar of not less than 150mm^2 section, running the whole length of the switchboard, to which shall be effectively connected all metal parts not intended to be alive. The Contractor shall be responsible for providing the connection to earth from this copper earth bar for effective earthing of non-active components of the switchboard.

b) The Contractor shall provide 25mm x 3mm copper bar connection between the main earth bar of the switchboard and an earthing terminal at the bottom of each cable box.

c) Facilities shall be provided for earthing either the circuit or busbars through the earthing switch for withdrawable type circuit breaker without the use of any loose earthing device, and with the use of a three position switch with integral earthing for fixed type circuit breaker.

d) The secondary circuit of each current transformer shall be earthed at one point only. The yellow phase of the three phase voltage transformer secondary winding shall be earthed. Means shall be provided for these earth connections to be disconnected at a readily accessible position for testing.

4.16 LOW VOLTAGE EQUIPMENT AND CONTROL CIRCUITS

4.16.1 Secondary Wiring

a) 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.

b) 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.

c) All PVC insulated panel wiring shall comply with the requirements of BS 6231 Type A or B as appropriate.

d) Conductors shall generally have a minimum cross section equivalent to **50/0.25mm (2.5mm^2)** 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 conductors equivalent to 30/0.25mm (1.5mm^2) or small sizes generally shall only be employed with written approval of the purchaser. All cables will be PVC-PVC type with steel wire armour.

e) Each CB and its associated equipment shall have one marshalling box for all the necessary wiring connections to separate panels. At the marshalling point, junction boxes shall be fitted with removable covers so that the terminals and connections can be made readily accessible. All control circuit wiring and auxiliary switch contacts shall be brought out to these junction boxes. The ends and taps of each CT secondary winding shall be brought out to the terminal strip where selection of CT ratios will be made as required. These terminals should be of the type, which has the provision for CT shorting.

f) 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.

g) 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 current transformers, which shall permit instruments to be connected without interrupting the secondary current transformer circuits.

h) Wire colours shall be as follows:

Wire Colour	**Circuit Particulars**
Brown Grey	DC Indication Circuits DC Circuits, other than Indication circuits
Red	A Phase connections in CT circuits
White	B Phase connections in CT circuits
Blue	C Phase connections in CT circuits
Green with Yellow Stripes	Connections to earth
Black	AC Neutral connections to the secondary circuits of CTs
Any other colours	Connections other than above

i) 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.

j) The ferrules on all wiring directly connected to circuit breaker trip coils, tripping switches, etc. shall be of a colour, preferably red, different from that of the remainder and marked "T" or "trip". No wires may be tied or jointed between terminal points.

k) Bus wiring between control panels etc, shall be fully insulated and be completely segregated from the main panel wiring.

l) All metallic cases of instruments, control switches, relays etc, mounted on panels shall be connected by means of green with yellow stripes PVC insulated copper conductors of not less than 2.5mm^2

sections to the nearest earth bar. The breaker panel circuits, which are extended for remote operation of alarm, indication and control functions shall be wired to terminals on the terminal board.

4.16.2 Miniature Circuit Breakers and Links

a) 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.

b) Facilities shall be provided to enable the control circuits for circuit breaker to be individually isolated for maintenance purposes.

c) A label shall be fixed immediately below each CB clearly showing the rating of the fuse link and its function.

4.17 Gland Plates and Cable Terminations

a) Switchgear shall be designed for cable entry from the bottom. Sufficient space shall be provided for ease of termination and connection.

b) All provisions and accessories shall be furnished for termination and connection of cables, including removable gland plates, cables supports, crimping type lugs, brass compression glands with tapered washer (Power cables only) and terminal blocks.

4.18 Wiring & Schematic Tables and Diagrams

a) Wiring diagrams or tables shall be provided and shall show exactly how the equipment is wired and must show both wiring and terminal numbers. Wires carrying main supplies must be indicated and show whether the supply is for protection or control etc. All diagrams shall be drawn as viewed from the back of the panel.

b) Schematic diagrams shall be provided and shall include all the wiring in all the plant supplied. Layouts shall be schematic and not geographical. Terminal numbers must be clearly shown and the equipment to which they belong clearly identified and the location of the equipment able to be determined. Where a relay coil is shown all contacts must be indicated adjacent to it. All contacts illustrated on other parts of the diagrams must be cross referenced and a brief description of their purpose given. The use of dotted lines to associate a contact with its coil is acceptable.

4.19 Bushing and Insulators

a) 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.

b) 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.

4.20 Auxiliary Supplies

Single phase, 240V, 50Hz AC supply to be used for panel heating and indication via step down transformer of adequate rating The electricity supplies for auxiliaries will be:

i) 240V AC Single Phase for panel heaters.

ii) Auxiliary supplies for essential indication

iii) 110V DC control supply for controls, protection, alarms and circuit breaker closing 110V DC shall be obtained from 110V DC station battery bank. All DC supply to the panels should be wired to the terminal block. Each bus shall have its dedicated DC supply. Separation of DC supply for indication and protection circuits is required.

The circuit breaker shall be capable of operating reliably at voltages down to 50% for circuit breaker tripping and 80% for other circuits.

4.21 Anti-Condensation Heaters

Any major items of the breaker panel which are liable to suffer from internal condensation due to atmospheric or load variations shall be fitted with heating devices controlled by thermostats suitable for electrical operation at 240 Volts A.C 50Hz single phase of sufficient capacity to raise the internal ambient temperature by 5ºC. The electrical apparatus so protected shall be designed so that the maximum permitted rise in temperature is not exceeded if the heaters are energised while the apparatus is in operation. Where fitted, a suitable terminal box and control switch shall be provided and mounted in an accessible position. All bus bar chambers should have heaters with provision to switch On when required and possibility of being maintained when Circuit is livened.

4.22 Nameplates

Each breaker bay shall be identified with its feeder designation engraved on laminated plastic tags of at least 40 x 100mm size. Tag information will be supplied by the Employer's Representative at site. The tags must be bolted or riveted onto a non-removable part of the cubicle. Stick-on or glued labels are not acceptable for this purpose.
Each cubicle shall have a rating plate with the information required by IEC 60298, i.e. at least the following

- manufacturer's name
- type number
- serial number
- rated voltage
- rated frequency
- rated current
- rated interrupt power
- actual rating at site conditions

Panel Labels:

- Cunningham Kinoya A
- Cunningham Kinoya B

Each device installed in the breaker bay, each terminal strip, and each indicating and operating element shall be identified with permanently attached plastic tags or labels of approved design. Inscriptions on these tags must coincide with those used on the drawings.

Each circuit breaker must have its own rating plate with information according to IEC 60056, i.e. at least the following:

- manufacturer's name
- Date of manufacture
- type and serial number
- rated voltage
- rated insulation level
- rated frequency
- rated normal current
- rated short circuit breaking current
- weight
- rated duration of short circuit, if different from 1second
- rated supply voltage of closing and opening devices
- rated supply voltage and frequency of auxiliary circuits
- actual rating at site conditions.

4.23 Corrosion Protection

The switchgear shall be treated and protected to withstand at least five years of operation after final taking over, under the site conditions without sustaining significant corrosion or attacks from fungus or rodents, provided the surfaces remain mechanically undamaged. Reference is made to Technical Specification – Grid Power Station 'Protective Treatment for structural steel works' of this Specifications and requirements specified there shall be fulfilled provided they are not contradictory to those below.

As a minimum painting standard for all steel surfaces, the following is applicable:

- cleaning to the bare metal by mechanical and/or chemical means
- phosphatizing, or priming with at least one coat of zinc or lead-based primer
- finish painting shall preferably consist of electro-statically applied and oven-dried epoxy-powder to a thickness of at least 80 microns. Alternatively, at least two coats of epoxy-based compound lacquer may be spray-applied.

If approved by the Employer's Representative, manufacturers standard paint colour may be used, but a light grey finish with high scratch resistance is preferred. All hardware used in the assembly of the switchgear must be either of corrosion proof material, or be hot dip galvanized.

4.24 Inspection and Testing

The switchgear is subject to inspection during manufacture. Routine testing of each switchgear bay shall be performed according to IEC 60694. The Contractor shall submit proposals for special tests, subject to the approval of the Employer's Representative.

Tests shall be performed generally at independent institutes, at the Contractor's premises if approved by the Employer's Representative, and at site (if applicable) in the presence of the Employer's Representative and further in strict accordance with:

- IEC 60298 for all the switchgear and control gear
  (Note: For internal arc tests to be regarded as type test, performance shall be according to the IEC 60298 Appendix AA)
- IEC 60056, IEC 60267, IEC 60427 and IEC 60694 for the circuit breakers
- IEC 60265 for MV switches
- IEC 60044- and IEC 60186 for current and voltage transformers
- IEC 60060, and others, as applicable.

Hereby, all test results and calculations evidencing the ratings under site conditions have to be submitted for

approval to the satisfaction of the Employer's Representative.

The following table lists the acceptable values for certain tests performed on the switchgear.

Test Description	Minimum Acceptance Criteria
Partial Discharge Measurements	< 250pC
Dissipation Factor Measurement	< 0.02
Contact resistance of main circuit	< 50μΩ
Dielectric Absorption test	ratio > 1.6
Insulation Resistance tests at 5kV	> 10GΩ

4.24.1 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 recognised 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 60056. Test certificates shall be submitted with the Bid. 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.

Note Type test certificate shall be submitted, or other certificates from independent international organizations may also be furnished. The testing laboratories shall be accredited and compliant to ISO/IEC 17025.

4.24.2 Routine Tests (Factory Tests)

Routine tests of each switchgear bay 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.

Routine factory tests, minimum:

- Pressure test on each enclosure. The test pressure for all cast housings shall be twice and for all welded housing 1.5 times the design pressure- At least 10% of welds must be subjected to non-destructive X- ray or ultra-sonic methods (random checks, according to pressure vessels regulations).

- Partial discharge test on each insulator before insulation in the switchgear. No measurable partial discharge (less than 7pC) shall occur on the insulator when 110% of rated voltage is applied. This test must be carried out on each post type insulator and bushing used in the switchgear.

The following test shall also form a part of the routine tests. These tests may be witnessed by buyer's authorised representatives on a non-interference basis:

- Power frequency voltage withstand test
- Rated voltage test on all auxiliary circuits
- Insulation resistance test with 2 kV on all auxiliary circuits
- Insulation resistance test with 5kV on all primary circuits including CB, CT, VT
- Dielectric Absorption Test
- Dissipation factor test
- Timing/Speed Test
- Contact timing test
- Contact Resistance Test 100A
- Pressure test
- Primary and secondary injection tests
- Complete mechanical operation test
- Function tests of all auxiliary devices, including all protective relays, alarm and trip circuits
- Verification of wiring against drawings and specifications
- SF6 Gas Analysis or vacuum integrity

The Employer's Representative must be informed at least three (3) weeks in advance regarding tests, which he desires to witness. The purchaser shall immediately be informed of any changes in the testing schedule.

Employer's Representative or his representatives shall be allowed access to all those areas in the manufacturer's factory where the equipment covered by this contract is produced at all reasonable times for purpose of inspection and obtaining information of the progress of work.

Acceptance by the Employer's Representative or his representatives of any equipment shall not relieve the manufacturer of his performance guarantees or from any of his other obligations resulting from the order.

4.24.3 Acceptance Test (Commissioning)

The following tests to be carried out as a minimum after installation of the switchgear at the site for commissioning purposes:

- rated voltage test on all auxiliary circuits
- Insulation resistance test with 2kV on all auxiliary circuits
- Insulation resistance test with 5kV on all primary circuits including CB, CT, VT
- Dielectric Absorption Test
- Dissipation factor test
- Contact Resistance Test at 100A test current
- High Pressure test
- Primary and secondary injection tests
- Circuit breaker timing test
- Complete mechanical operation test
- Current transformer ratio, polarity, magnetisation curve, voltage withstand of secondary wiring
- Voltage transformer ratio, polarity, voltage withstand of secondary wiring
- Function tests of all auxiliary devices, including all protective relays, alarm and trip circuits
- Testing of SCADA IO points
- Control locally using HMI computers

5.0 PROTECTION, METERING AND CONTROL

5.1 Arrangement of Facilities

Protection and control equipment shall be mounted on panels and boards as specified and shall be erected in permanent buildings on the substation sites. If existing protection is required to be modified for any reason, e.g. in order to operate with newly installed equipment, the Contractor shall supply all the necessary relays, panels, wiring terminals, wiring, etc. in order to ensure satisfactory performance.

All components shall be suitable for the local climate and the control and protection panels shall be dust, venom and moisture proof to withstand all prevailing climatic conditions. The specified maximum ambient temperature shall be taken into consideration in closed rooms. The Contractor shall design the systems and select equipment accordingly. Open-air installed parts shall be protected against sun radiation by means of adequate and almost totally corrosion free steel covers, and shall be able to withstand all other prevailing climatic conditions. All instrumentation and control equipment shall be capable of continuous satisfactory operation, within the specified accuracy ranges, during a change of the supply voltage within the specified limits.

All equipment as well as the terminals of the panels shall be easily accessible. Space for at least one panel at each row of panels on either side in addition to the final extension stage shall also be provided. The instruments, relays, switches etc. on the front of the panels shall be arranged in such a way that a good overview, reading and maintenance will be guaranteed. Furthermore all instruments, relays, etc. shall be clearly labelled in relation to their functions and to the equipment to be protected or supervised, or to the location of any measuring point. Labelling shall be identical in panels and on drawings. The front panel shall also contain a test block(MMLG01) for testing purposes. Where appropriate, each item of the plant is to be equipped with all necessary auxiliary switches, contactors and mechanisms for indication, protection, metering, control, and interlocking, supervisory and other services. All auxiliary switches are to be wired up to a terminal board on the fixed portion of the plant, whether they are in use or not in the first instance. For maintenance purposes, it must be possible to individually isolate the protection and control circuits.

Tripping interface shall be provided such that any protection relay's tripping on the higher voltage side shall trip the lower voltage side's circuit breaker and vice versa for transformer faults. Back-up protection for other than transformer faults (external faults), installed at the low voltage side of the transformer shall only trip the low voltage side's circuit breaker and keep the transformer energized from the primary network side.

Notwithstanding the technical particulars such as current ratio or voltage ratio or the number of secondaries indicated in these drawing and listed in the schedules, the successful contractor shall provide the adequate numbers of CT, interposing CT with adequate numbers of secondaries of sufficient ratings to ensure proper functioning of the Protection Scheme specified.

5.2 Labels on Relays and Instruments

Labels written in English shall be provided for all instruments, relays, control switches, push-buttons, indication lights, breakers, etc. In the case of instruments, switches and control switches where the function is indicated on the dial plate or on the switch escutcheon plate, no label is required. Relays shall be clearly labelled according to their function in the circuits, and to their related equipment, which shall be identical to the designations as used in the circuit manuals. Each label shall be fitted both on relay front and on relay assembly. Instruction plates in English language showing the sequence diagrams or cautions for maintenance shall be fitted inside of the front door of the electrical switchboards. Sample of writings shall be submitted for approval to the Employer's Representative.

5.3 Test and Earthing Facilities

Each control or relay panel shall be provided with a copper earth bar of not less than 80 mm2 cross-section and arranged so that the bars of adjacent panels can be joined together to form a common bus. The common earthing bus bar of control and relay panels shall be connected to the main station earthing system via a copper earthing connection of not less than 80 mm2.Each current transformer secondary circuit shall be earthed through a removable link at one point only.

All tests shall be carried out through a test block with a use of a test plug. The test block shall be mounted on the front of the panels for easy access. Test facilities shall be provided to allow input quantities to be injected into each protective relay, and the operation of the relay checked. The removal of wiring from terminals for testing purposes is not acceptable. All necessary plugs, sockets, leads and any other apparatus required to be used with the above test facilities shall be included in the tender. The Tenderer shall provide MMLG test block for each protection device for testing purpose.

5.4 Protection Devices

Only approved protection devices shall be used, as specified in these specifications. Protection equipment shall be designed and applied to provide maximum discrimination between faulty and healthy circuits. All equipment's are to remain inoperative during transient phenomena which may arise during switching or other disturbances to the system except power system faults. The performance of the protection system and the performed coordination with the current transformer design shall be ensured. The Contractor shall submit a comprehensive technical report, which shall ensure that current transformer's and relays are designed saturation free under both transient and steady state fault conditions. The ratio of current transformers given in the SLD is a general guideline only. Proper calculations should be used to verify these ratios. Current transformers, where possible, are to be located so as to include the associated circuit breaker within the protected zone and shall be located generally as indicated on schematic drawings.

5.5 Relays

Relays shall be of approved types complying with latest version of the IEC 60255, and shall have approved characteristics. Only protective relays from well-established manufacturers with a minimum of ten years successful experience in manufacturing protective relays and relays designed to identical relays with a minimum of three years field experience will only be accepted. The preferred relay is SEL. The protection relays, shall be located in specified panels and shall be flush-mounted in dust and moisture proof cases with protection class IP54 and of the draw out type with rear connections. The protection class of the cover for all relays, or protection systems, in which the modules are mounted in 19" racks shall be IP40 or better. Relays shall be of approved construction and shall be arranged so that adjustments, testing and replacement can be effected with the minimum of time and labour. Relays of the hand reset type shall be capable of being reset without opening the case. Electrical protective relays shall be only of numerical type. Numerical protection shall be designed in such a way that in case of a failure of DC auxiliary in feed, the full information needs to be maintained for at least 24 hrs. After a recovery of DC auxiliary in feed the last information and alarms will be displayed and the alarm "failure of DC auxiliary in feed" released. The relay reset shall not erase the relay memory. The protection functions shall be in the form of software such that additional or different functions, application specific logic etc. can be readily implemented without changes to the existing hardware.

All the numerical type protective relays shall be possible to program / parameterise directly (locally) and remotely by a portable computer (PC). All accessories equipment needed to communicate with the relays shall be provided. The relays shall be connected to the substation LAN which could be remotely accessed for required interrogation/download. Provision shall be made for future installation of network switches (one per bus). The relay internal clock should have the provision to be updated by the EFL SCADA master clock. A GPS clock should be utilised to update the relay internal clock in case this provision is not available. The relay event log, disturbance records should be time tagged and these should be able to retrieve both locally and remotely by the substation LAN. The accuracy of time tagging shall be within 1 ms.

The following types/models of protection relays shall be supplied:

- SEL351S for distribution feeder protection, over current and earth fault protection, CB Fail protection, auto-reclosing and sync-check (where applicable) shall also be incorporated within the same relay.

- SEL 311L for feeder differential protection

All the main protection relays shall have disturbance recorder and an event recorder in-built to them. Events shall be time tagged in the order of millisecond accuracy and the capacity shall be at least 100 events. The disturbance recorder shall include at least 6 analogue channels and 10 binary channels and the recording duration shall be at least 3 seconds. Relay contacts shall be suitable for making and breaking the maximum currents which they may be required to control in normal service but where contacts of the protective relays are unable to deal directly with the tripping currents, approved auxiliary contacts, relays or auxiliary switches shall be provided. In such cases the number of auxiliary contacts or tripping relays operating in tandem shall be kept to the minimum in order to achieve fast fault clearance times. Separate contacts shall be provided for alarm and tripping functions. Relay contacts shall make firmly without bounce and the whole of the relay mechanisms shall be as far as possible unaffected by vibration, shock and bump or external magnetic fields. Relays which rely for their operation on an external DC supply shall utilise for this purpose the same DC supply as the trip supply of the associated circuit-breaker trip coil. This supply shall be monitored and an alarm provided in event of failure. Any auxiliary supplies needed shall be drawn from the main station batteries and not from separate internal batteries in the protection equipment.

Relays shall utilise a DC-DC converter type regulated power supply to provide transient surge isolation between the station battery and protection equipment. Each DC supply shall be designed to protect it from high voltage and surge and provide electrically isolated contacts for annunciation. Relays with provision for manual operation from outside the case, other than for resetting, will not be accepted. Relays shall be provided with clearly inscribed labels describing their application, version, type, serial number and rating etc. in addition to the general purpose labels. The protection schemes shall incorporate interface facilities to transform any offered low rated input/output signals of required equipment, to the necessary rated input/output signal. Unless otherwise specified, tripping shall always be directly from the relevant measuring relay. Any tripping relay, which completes the protection relays' initiated tripping of a circuit breaker, shall have an operations indicator. The tripping contactors' operation must be guaranteed also with 50 % of the rated DC voltage (pick up at 80 % of DC, self-holding down to 50 % of DC).

All protection relays shall be equipped with dedicated DC supply via MCB. The DC supply of all the protection relays shall be maintained by means of an auxiliary contact of the related MCB, which provide alarm in case of loss of supply. Any interruption of the DC supply to relays (internal and external) shall initiate an alarm. Converters and inverters used for feeding relays shall have their outputs monitored and shall initiate an alarm in the event they fail. These devices shall be of short circuit proof design. All relays shall be adequately protected against damage from incoming surge and shall meet relevant IEC standards.

All SEL protection and communication devices shall be ordered with and **DNP3 and IEC61850 capability**, with conformal coated boards and extended I/O boards. Fiber optic port connections on relays shall be of SC type. All protection relay communications to station RTU shall be over fiber optic communications cables provided by the Contractor. The fiber optic cables shall be vermin proof and of SEL make.

A lockout relay shall be installed to avoid reclosing when a unit protection device has operated on the, transformer or busbar. The closing of breaker after a tripping due to a unit protection element shall only be done after a visual inspection has been carried out.

EFL intends to employ circuit breaker fail scheme on the 33kV switchboard. Circuit breaker fail scheme will only trip the faulty section of the bus and the bus section VCB.

All protection relays shall be connected to a SEL2488 GPS clock, provided by the bidder to be mounted on the 33kV switchboard. The bidder assisted by EFL team shall mount the GPS clock antenna via a surge arrestor on a suitable location in the substation building. Tthe bidder shall also provide SEL2730 Ethernet switch which shall be mounted on the switchgear or EFL's SCADA Panel and connected to the protection relays.

5.6 Factory / Site Tests and Standards

The Contractor shall submit the applicable type test certificates in accordance with latest IEC standard for all relays before they are approved. Separate schedules for protection equipment factory and site tests shall be submitted for approval at least one month before the start of tests. The Employer's Representative/Employer inspection of control and protection panels shall be arranged at least two weeks prior to packing for shipment when the contractor is ready for panel inspection. Customer's inspector shall have the authority to reject any items which are found defective or not in conformity with the requirements of the specification. If the inspector rejects any item, the contractor either replaces or makes alterations necessary to meet specification requirements free of charge. Protection schemes mounted in cubicles shall be completely wired, tested and inspected at the manufacturer's factory. The only work to be performed at site shall be the connection to the external devices and the commissioning tests.

All types of test equipment and tools required by the Contractor for tests at Site and commissioning tests shall be provided and included in the quoted Scope of Work / Scope of Supply, whether specifically mentioned or not. Where work permits are required, the Contractor shall give sufficient notice to the Employer's Representative to allow the necessary outage to be arranged. The results of all tests shall be submitted, in handwritten form immediately following completion of the tests, and within ten days typewritten copies shall be supplied according to the requirements of these Tender Documents. The Contractor shall submit the results (as requested) of any test he may carry out on his own, following manufacture, installation or Site testing, as well as those required herewith. The equipment shall meet the requirement of IEC 60255-11 and their performance shall not be affected under the following conditions:

- Interruption to the DC auxiliary supply of duration up to 10 ms
- AC. component (ripple) in the DC auxiliary supply up to 5% of rated value

All protection relays and other equipment manufacturers shall be clearly informed of EFL being the end user and EFL's contact details shall be left with the manufacturer for any future correspondence regarding their product.

All bus section circuit breaker panel must come with synchronism check facility, a Nemo meter on each panel showing the two bus voltages, a synchroscope and permit to close indication.

All power transformer circuit breaker panels must have synchronism check function, a Nemo meter on each panel showing circuit voltage, bus bar voltage, a synchroscope and permit to close indication.

6.0 SCADA AND SUPERVISORY EQUIPMENT

The 33kV switchgears at Old Kinoya Substation shall also be operated completely unmanned and centrally controlled from the National Control Centre at Vuda.

The medium of Communication shall be single mode optic Fiber cable. This will be provided by the employer and is not in the scope of the contract.

Local/Remote control switches will be used for control circuits and shall be wired via the SEL relays.

All 33kV controls and metering to the SCADA via a SEL3530/IEC 61850 communication relay. All the SEL relays connected to each section of the busbar shall be connected to the dedicated SEL3530 communications processor via Ethernet. The SEL3530 relays used at Old Kinoya Substation will be connected to the existing SCADA termination equipment via Ethernet port.

The programming of the SEL protection relays and the SEL3530 communications processor will be EFL's responsibility. This should also include the remote access programming.

Remote operation of the switchgear shall be tested by the contractor in conjunction with EFL.

General guidelines for the Employers SCADA input output (IO) points required are as per the list below. The SCADA IO listing will be finalised during detailed design stage after considering the design of the offered circuit breaker and control circuits.

The contractor shall provide the I/O list with DNP3 addresses to EFL for programming at the Master Station. All

SEL relays and SEL equipment shall comply with conformal costing and IEC 61850.

6.1 36 kV IO Points

ITEM	33kV FDR CB CONTROL		STATION	
CONTROL	LOCAL	SCADA	LOCAL	SCADA
Open/Close	✓	✓		
Dead Bar Close				
AutoSync				
Generator Start/Stop				
Generator Speed Raise/Lower				
Generator Volts Raise/Lower				
Protection On	✓	✓	✓	✓
Protection Off	✓	✓	✓	✓
Reset Protection Relay	✓	✓		
OLTC Auto/Manual				
OLTC Raise/Lower				
OLTC Master/Follower				
INDICATIONS	LOCAL	SCADA	LOCAL	SCADA
Open/Close	✓	✓		
Dead Bar Close	✓	✓		
Synchronising in Progress	✓	✓		
Synchronise Fail	✓	✓		
Distance to Fault Location				
Station Local/Remote Control	✓	✓	✓	✓
Auto Reclose In				
Auto Reclose Out				
Auto Reclose in progress				
Protection On	✓	✓		
Protection Off	✓	✓		
Protection Fault				

ITEM	33kV FDR CB CONTROL		STATION	
Tap Position				
Battery Charger DC fail				
Station A/C Supply fail				
Spring Charged	✓	✓		
MEASUREMENT	LOCAL	SCADA	LOCAL	SCADA
MW				
MVar				
Import/Export MW			✓	✓
Import/Export Mvar			✓	✓
Import/Export MWh			✓	✓
Import/Export Mvarh			✓	✓
Frequency			✓	✓
Incomimg/Existing Frequency				
Delta Frequency				
R-ph Amps	✓	✓		
Y-ph Amps	✓	✓		
B-ph Amps	✓	✓		
Kilovolts	✓	✓	✓	✓
ALARMS	LOCAL	SCADA	LOCAL	SCADA
R-ph Overcurrent Trip	✓	✓		
Y-ph Overcurrent Trip	✓	✓		
B-Ph Overcurrent Trip	✓	✓		
Earth Fault Trip	✓	✓		
Pilot Cable Translay Protection Trip				
Distance Protection Phase Trip				
Distance Protection Zone 1 Trip				
Distance Protection Zone 2 Trip				
Distance Protection Zone 3 Trip				
Distance Protection Faulty				

ITEM	33kV FDR CB CONTROL		STATION	
AutoRecloser –Operated				
Auto Reclose Lockout				
AutoRecloser RelayFailed				
SBEF Trip				
HV Earth Fault Trip				
HV REF Trip				
HV REF Trip				
REF Trip				
R-ph Differential Protection Trip				
Y-ph Diifferential Protection Trip				
B-ph Diifferential Protection Trip				
Bucholz Gas Alarm				
Main TX Bucholz Surge Trip				
Main TX Winding Temp High Warning				
Main TX Winding Temp Trip				
Generator Warning Alarms				
Generator Shutdown Alarms				
Zone Protection Trip				
Zone Protection Fail				
Overvoltage Trip				
Recloser Trip/Reclose				
Recloser Lockout				
Spring Charge Fail	✓	✓		
CB Fail	✓	✓		
Local Remote	✓	✓		
Protection Fail	✓	✓		
Remote Control Blocked	✓	✓		

7.0 RECOMMENDED SUPPLIER and MANUFACTURERS, PLACES OF MANUFACTURE & TESTING

ITEM	MANUFACTURER	PLACE OF MANUFACTURE	PLACE OF TESTING & INSPECTION
33kV Circuit Breakers			
33kV Copper Busbar			
33kV Current Transformers			
33kV Voltage Transformers			
33kV Switch Panels			
Protection Relays	SEL		
Meters	SHARK 200/ NEMO HD+		
Anti-Condensation heaters			
MCBs	Schneider		
Control and selector switches	KRAUS & NAIMER		
Interlock relay	Sprecher+Schuh		
Indication lamps	Schneider ZB5AV		
Push buttons	Schneider XB5		
Measuring disconnect terminal	Weidmuller WTL 6/1/STB		
Terminals of type	Phoenix Contact UK2.5B		
Cable trunking	Critchley Betaduct		
DIN Rail	Weidmuller TS35		
240/120VAC, 250VA Control transformer	Legrand 442 65		
Bus zone lockout relay	ALSTOM		
Test blocks	ALSTOM		

8.0 TECHNICAL PARTICULARS AND GUARANTEES

8.1 BUSBARS

	Item	Units	Required/Tendered
			36 kV
1.	Rated Normal Current	A	2000
2.	Rated current at Max. ambient temperature	A	
3.	Conductor Material		Cu
4.	Standard Applicable		
5.	Single conductor Cross section	mm^2	
6.	Insulation material		
7.	Fire Certification (IEC 60466, etc)		

8.2 CIRCUIT BREAKERS

	Item	Units	Required	Tendered
			36 kV	36 kV
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	
7.	Type test Report, Ref No.			
8.	Rated Voltage	kV	36	
9.	Rated Frequency	Hz	50	
10.	Rated Normal Current at 20°C			
	- Line feeder circuit breaker	A	1250	
11.	Rated Current at Max. ambient temperature			
	- Line feeder circuit breaker	A		
12.	Rated Lightning Impulse Withstand	kV	185	
12.	Rated 1 min Power Frequency Withstand	kV	70	
14.	Rated short circuit breaking current (symmetrical, r.m.s)	kA	31.5	
15.	Rated short circuit breaking current (asymmetrical, r.m.s)	kA	31.5	
16.	Rated making current (peak)	kA	80	
17.	Rated Duration of Short Circuit Current	s	3	
18.	Rated cable charging breaking current	A		
19.	Rated line charging breaking current	A		
20.	Rated small inductive breaking current	A		
21.	Voltage drop across terminals of one pole at rated current	mV		
22.	Amplitude factor			
23.	First pole-to-clear fault		1.5	

	Item	Units	Required	Tendered
			36 kV	36 kV
24.	Rated operating sequence		O-0.3 sec-CO-3 min-CO	
25.	Min. time t" between two successful three phase auto reclosures at full rated breaking current (sequence O-0.3-C-t"-O-0.3-C)	min		
26.	Closing time	ms		
	- tolerances	ms		
27.	Dead time (max)	ms		
	- tolerances	ms		
28.	Break time (max.) at full rated breaking current	ms		
	- tolerances	ms		
29.	Make time (max.)	ms		
	- tolerances	ms		
30.	Arcing time (max.) at full short circuit duty	ms		
	- tolerances	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	No.	Min 100	
33.	**Auxiliary contacts:**			
	- number NO/NC			
	- voltage rating	V DC	110	
	- current rating	A DC		
34.	**Making coil**			
	- Rated voltage	V DC	110	
	- min. operating voltage	V	88	
	- Rated power each	W		
35.	**Trip coil**			
	- Rated voltage	V DC	110	
	- min. operating voltage	V	55	
	- Rated power each	W		
36.	Motor Voltage	V DC	110	
37.	Motor Power	W		
38.	Max. temperature rise of contacts at rated normal Current	K		
39.	Arc quenching medium		Vacuum /SF_6	
40.	Material of main contacts			
41.	Maximum Shock load imposed on floor or foundation when opening under fault conditions (compression or tension)	N		
42.	**Minimum Clearances in air**			
	(a) Between phases	mm	120	
	(b) Phase to earth	mm	120	
	(c) Across CB poles	mm	120	

	Item	Units	Required	Tendered
			36 kV	36 kV
43.	Material of filter employed for the absorption of the products of combustion			
44.	Method of controlling voltage distribution between breaks (capacitor, resistor etc.)			
45.	Weight of complete 3 pole breaker	kg		
46.	Weight of heaviest part for shipment	kg		
47.	Period the equipment has been in commercial operation	years	> 25	

8.3 CURRENT TRANSFORMER

	Item	Units	Required	Tendered
			36 kV	36 kV
1.	Manufacturer			
2.	Type			
3.	Applicable Standards - IEC		61869	
4.	Rated secondary current	A	1	
5.	Rated lightning impulse withstand voltage (primary)	kV		
6.	Rated Power Frequency withstand voltage (primary)	kV		
7.	Rated short-time current			
8.	Protection cores (Transformer Diff):			
	- Rated Primary Current	A	As per list	
	- Accuracy class	Class	0.1PX	
	- Resistance of secondary winding at 75°C	Ohms	< 3	
	- Rated Burden	VA	25	
9.	Protection cores(OC & EF for feeders):			
	- Rated Primary Current	A	As per list	
	- Accuracy class	Class	5P20	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3	
	- Rated Burden	VA	25	
10	Protection cores(Bus Section):			
	- Rated Primary Current	A		
	- Accuracy class	Class	0.1PX	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3	
	- Rated Burden	VA	Min 25	
11.	Number of Cores	No.	See scope of works and Drawings	
12.	Knee point e.m.f. of protection cores	V	Min 450	
13.	Knee point e.m.f. of busbar protection cores	V	Min 415	
14.	Insulation material for windings			
15.	Limits on exciting current	A		
16.	Partial discharge	pC	< 50	

8.4 VOTLAGE TRANSFORMER complete with FUSE and RESISTOR

	Item	Units	Required	Tendered
			36 kV	36 kV
1.	Manufacturer			
2.	Type		Dry	
3.	Applicable Standards - IEC		61869	
4.	Method of transformation		Inductive	
5.	System Voltage	kV	36	
6.	Type of supply		3 phase	
7.	Frequency	Hz	50	
8.	Basic Insulation Level	kV	75	
9.	Creepage distances	mm		
10.	Transformation ratio			
11.	Class of accuracy	0.1		
12.	Class of insulation			
13.	Number of secondaries and accuracy class		See scope of works & drawings	
14.	Thermal capacity of ground-fault detection winding	A/h		
15.	Rated burden (total on all secondaries)	VA		
16.	Partial discharge		Acc. IEC 61869	
17.	Height	mm		
18.	Weight of single pole unit	kg		
19	Burden	VA	30	

8.5 SWITCH PANELS

	Item	Units	Required	Tendered
			36 kV	36 kV
1.	Manufacturer			
2.	Type			
	rated voltage	kV	36	
2.	Applicable Standards - IEC		IEC 60694	
	Impulse withstand voltage kV peak	kV		
	Power frequency withstand voltage	kV		
4.	Thickness	Mm		
5.	Short time rating, 3 sec	kA	31.5	
6.	Integral earthing switch for feeder and busbar	Yes/No	Yes	
7.	Short circuit rating of earth switch			
8.	Making capacity of earth switch			
9.	Transducer and Local Energy Meter (Transformer)			
	- Manufacturer and model		NEMO	
	- protocol		DNP3	
10.	Transducer and Local Meter			
	- Manufacturer and model		NEMO	
	- protocol		DNP3	
11.	Anti Condensation heater			
	- Manufacturer			
	- Heater voltage			
	- Heater Output	W		

	Item	Units	Required	Tendered
			36 kV	36 kV
	Is heater switch provided		Yes	
12.	Material			
	Surface Finish			
	Dimensions			
	Length	mm		
	Width	mm		
	Height	mm		
13.	Total Net Weight	kg		

8.6 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

As a minimum, the following documents & drawings shall be submitted with the Bid.

1. Detail layouts of the Indoor 36 kV switchgear.
2. Single line diagrams.
3. Manufacturer's Technical Brochures type number, reference number and Drawings showing details of construction and dimensions of circuit breakers, current transformers, voltage transformers, transducers and other major equipment.
4. Typical arrangement drawing of control, metering and relay panel.
5. Diagrams indicating functions of Control & Protection LED's in each bays.
6. Protection block diagrams and typical diagrams of unit protective equipment
7. Independent type test certificates for,
    i. 36 kV Indoor Circuit Breaker
    ii. Current Transformers.
    iii. Voltage Transformers.
8. General bar chart of the design, manufacturing, shipping, erection and commissioning schedule.
9. Evidence of Bidder's experience in works similar to this.
10. Certificates issued by an independent International Organization to ensure compliance with the ISO 9001:2000 standards by Bidder.
11. List of standards the Bidder intends to follow.
12. Descriptive information for equipment being offered including:
    i. List of recommended spare parts with prices.
    ii. List of special tools or fixtures required for installation, testing, maintaining and operating the equipment
    iii. List and cost of special tools, lifting devices required for installation, operation and maintenance.
    iv. List of exceptions to and deviations from this specification. All exceptions shall be clarified and separately itemized. It shall not be necessary for the employer to examine the standard literature and documents of the manufacturer to determine the existence and extent of any exceptions or deviations from this specification.
    v. Evidence of field service experience of main equipment.

Section 5 - Form of Proposals and Appendices

Form of Technical Proposal

To:
Jitendra Reddy
Manager Procurement,Inventory & Supply Chain, Supply Chain
2 Marlow Street, Suva
Fiji
Email: jreddy@efl.com.fj

Contract No: _____

Gentlemen:

We have examined the Conditions of Contract, Employer's Requirements, Schedules, Addenda Nos ____and the matters set out in the Appendix hereto. We have understood and checked these documents and have not found any errors in 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.

We further undertake, if invited to do so by you, and at our own cost, to attend a clarification meeting at a place of your choice, for the purpose of reviewing our Technical Proposal and duly noting all amendments and additions thereto, and noting omissions therefrom that you may require, and to submit a supplementary price proposal if the amendments, additions and omissions that you require would alter our price proposal as submitted with our bid.

We accept your suggestions for the appointment of the Dispute Adjudication Board, as set out in Schedule _ [We have completed the Schedule by adding our suggestions for the other member of this three-person Board, but these suggestions are not conditions of this Bid].[1]

We are, Gentlemen

Yours faithfully

Signature _____in the capacity of _____duly authorized to sign bids for and on behalf of _____

_

Address
_____
_____

_____

[1] If the Bidder does not accept, this paragraph may be deleted and replaced by:

We do not accept your suggestions for the appointment of the Dispute Adjudication Board, and propose that we jointly agree upon the appointment after the Effective Date (unless previously agreed) in accodance with Sub-Clause 20.3 of the Conditions of Contract. *[**OPTIONAL:** Our Proposal includes our suggestions for this appointment, but these suggestions are not conditions of this Bid.]*

Appendix to Technical Proposal

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

	Sub-Clause	
Employer's name and address	1.1.2.1 & 1.8*	Energy Fiji Limited, Private Mail Bag, Suva, Fiji
Contractor's name and address	1.1.2.2 & 1.8	_____ _____
Name and address of the Employer's Representative	1.1.2.2 & 1.8	Jitendra V. Kumar, EFL, Private Mail Bag, Suva, Fiji
Time for notice to commence	8.1	28 days
Time for Completion of the Works	1.1.3.4	12 months after signing of contract
Electronic transmission systems	1.8	Email
Confidential details	1.12	Nil
Time for access to the Site	2.2	7 days after the Commencement Date
Amount of performance security	4.2*	Ten (10%) of the Contract Price and in the proportions of currencies which the Contract Price is payable
Time for submission of programme	4.14	7 days after the issue of Letter of Acceptance
Normal working hours	6.5	8.00am to 4.30pm, Monday to Friday
Liquidated damages for delay	8.6*	0.5 % 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*	Five (5) % of the Contract Price
Amount of insurance for design	18.1	Full value of the 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 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	Fiji

Initials of signatory of Bid _____

Form of Price Proposal

To:
Mr. Jitendra Reddy
Manager Procurement,Inventory & Supply Chain, Supply Chain
2 Marlow Street, Suva
Fiji
Email: JReddy@efl.com.fj

Contract No: _____

Gentlemen:

We have examined the Conditions of Contract, Employer's Requirements, Schedules, Addenda Nos ____and the matters set out in the Appendix hereto. We have understood and checked these documents and have not found any errors in 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 fixed lump sum 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 Bid Data Sheet or during the clarification meeting of the First Stage bid) as the Adjudicator.

We agree to abide by this Bid until _____and it shall remain binding upon us and maybe accepted at any time before that date. We acknowledge that the Appendix forms part of our Bid.

If our bid 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 Technical Proposal.

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

We understand that you are not bound to accept the lowest or any bid 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 bids for and on behalf of _____

Address
_____
_____

Date _____

Appendix to Price Proposal

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

	Sub-Clause	
Employer's name and address	1.1.2.1 & 1.8*	Energy Fiji Limited, Suva, Fiji
Contractor's name and address	1.1.2.2 & 1.8	_____ _____
Name and address of the Employer's Representative	1.1.2.2 & 1.8	Abhineet Sharma EFL, Private Mail Bag, Suva, Fiji.
Total amount of advance payments	13.2*	NIL
Number of instalments	13.2	NIL
Start repayment of advance payment	13.2(a)	NIL
Repayment amortization of advance payment	13.2(b)	NIL
Percentage of retention	13.3(c)*	Ten (10)%
Limit of Retention Money	13.3(c)*	Ten (10)% of the Contract Price
Minimum amount of Interim Payment Certificates	13.6*	Ten (10)% of the Contract Price
If Sub-Clause 13.15 applies:		
Payments in Local and Foreign Currencies	1.1.5.3 & 13.15	

Currency Unit	Amount Payable in such Currency
Local: _____[name] Foreign: _____[name] _____ [name]	_____ _____ _____

Initials of signatory of Bid _____

Appendix to Locality Plan: Locality Map of 33/11kV Substation Site of Old Kinoya Substation

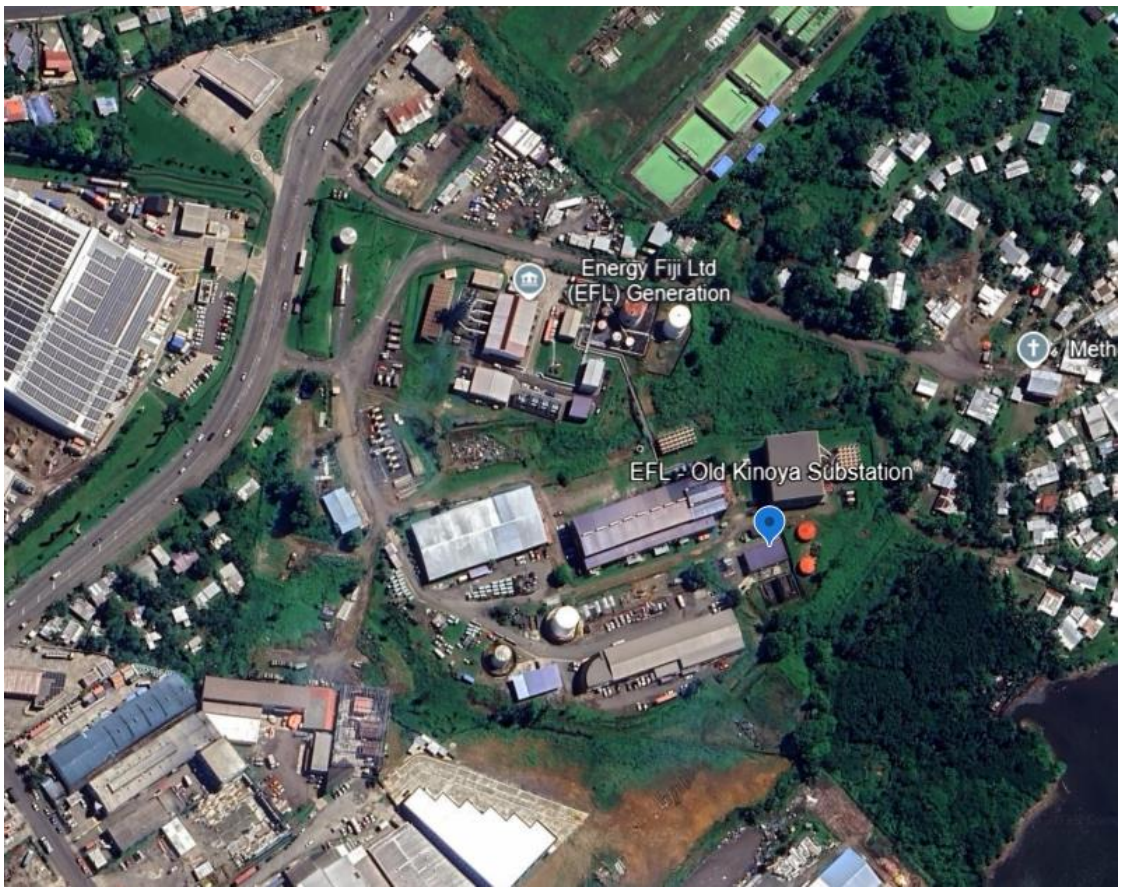

Figure 1: EFL's Old Kinoya Substation Site Location

Section 6 - Sample Forms

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 Installation of 33kV Switchgear for Waitolu Substation should be designed and executed by the Contractor, and has accepted a Bid 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 Bid dated _____
(e) The Conditions of Contract (Parts I and II)
(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 Contractor SEAL (if any)	Authorized signature of Contractor SEAL (if any)
in the presence of:	in the presence of:
Name _____ Signature _____ Address _____	Name _____ Signature _____ Address _____

Form of Performance Security
(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 7 – Schedules: Part I Schedule of Prices

9.0 NOTES ON SCHEDULES

The Schedules are intended to provide the Employer with essential supplementary information in an organized format. Examples of more commonly used Schedules are given herein. Others may be devised and added in accordance with the requirements of the Instructions to Bidders.

All the Schedules are essential for bid evaluation and some in contract execution; they should all be incorporated in the Contract, and appropriate changes introduced with the approval of the Employer or its representative.

The schedules are to be completed and submitted as part of the Technical Proposal and Price Proposal in accordance with the Instructions to Bidders Clause 13, Documents Comprising the Bid.

10.0 SCHEDULE OF PRICES & CONDITIONS OF PAYMENT

10.1 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 labour, materials, plant, supervision required to complete the Contract Works, overheads and profit, subject only such adjustment as is provided for the Contract.

10.2 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.

10.3 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.

10.4 PAYMENTS TERMS

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

	Particulars	**Milestone**	**Payment (% of contract price)**
A	**Plants and Equipment – Offshore Component**		
1	Design Review	Upon completion of Design Review	10%
2	Delivery of Plant and Equipment to Substation Site	After Factory Acceptance Testing with Bank Guarantee/Standby Letter of Credit at Suppliers Port	50%

3	Installation and commissioning of new switchgear	Upon completion of commissioning, rectification of defects and issuing of performance certificate. This should include WHT of 15%.	30%
4	Retention	Upon completion of 12 months after issuing of takeover certificate or upon issuing of BG/LOC by supplier upon commissioning.	10%

B	**Installation and Training – Local Component**		
1	Installation and Commissioning of new switchgear	Upon completion of commissioning, rectification of defects and issuing of performance certificate	90%
2	Training	After completion of overseas and Local Training	10%

11.0 SCHEDULES OF RATES & PRICES

11.1 NOTES ON SCHEDULES OF RATES AND PRICES

1. The Schedules are divided into separate sections as follows:

Section	Description
11.2	Price Schedule of Main Items
11.3	Alternative Offers
11.4	Recommended Tools & Spare Parts
11.5	Summary of Prices
11.6	Bidders Tools & Equipment
11.7	Rate of Variations

2. The quantities shown in these schedules are estimates only.

3. 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. Bidders shall be deemed to have read the Employer's Requirements and other section of the bidding 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.

4. Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the bidding documents.

5. For each item, bidder shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

6. 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 bidding documents.

7. Items left blank with be deemed to have been included in other items.

8. 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.

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

11.2 PRICE SCHEDULE ON MAIN ITEMS

ITEM NO.	DESCRIPTION	ESTIMATE QTY	CFR – Off- SHORE Foreign Currency		CFR – ON SHORE FJD Currency		ERECTION ON SITE		TOTAL AMOUNT (Excluding Taxes & Duties and VAT)	
			Unit Rate	Amount	Unit Rate	Amount	Unit Rate	Amount	F/C	FJD
			(1)		(2)		(3)		(4=1)	(5=2+3)
1	**CIRCUIT BREAKER + CT**									
1.1	1250A, 36 kV, 31.5 kA/ 3 Sec,3 phase circuit breaker complete with housing panel – (Feeder Breaker)	2 Nos								
1.2	Line Diff (0.1PX), OC/EF(5P20) and Bus Zone CT (0.1PX)	2 Set								
2	**VOLTAGE TRANSFORMERS**									
2.1	Three phase voltage transformers, ratio 33,000/√3:110/√3:110/√3 V Class 0.2 for Metering and Protection	2 Nos								
3	**PROTECTION RELAYS, WIRING, PROGRAMMING and TESTING**									
3.1	SEL 351S	2 Nos								
3.2	SEL 311L	2 Nos								
4	**INSTALLATION and** COMMISSIONING									
4.1	Installation of switchgear	2 Panels								
4.2	Testing and commissioning of switchgear (cost of test equipment to be shown separately)	2 Panels								
4.3	With Holding Tax (WHT) 15% of the installation and Service Cost	15%								
5	**TRAINING**									

5.1	Training at the Site after installation	1 Lot									
6	**SPARES**										
6.1	Manufactures Spares. Bidder to provide complete list	1 set									
6.2	Tools and Equipment	1 set									
6.3	EFL required spares.	1 set									
7	**MISCELLANEOUS**										
7.1	Design Review at Manufacturer's Location **OR**	2 Person									
7.2	Online Design Review										
7.3	Factory Acceptance Testing (FAT) Witness Testing	2 Person									
7.4	Others										
	TOTALS										

Note: The Employer reserves the right to exclude any items at his discretion. Total price shall be adjusted accordingly

12.0 RECOMMENDED TOOLS & SPARE PARTS

As per clause 3.10 of the technical specifications, the bidder 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.

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

Note: Bidder to provide a list of mandatory spares in the above table and include the cost of this mandatory spares to **Part 6 Spares** in the Price Schedule above.

12.1 EFL Required Spares

As per clause 1.0 of the technical specifications, the bidder is required to provide the prices for spare parts as requested by Energy Fiji Limited (EFL).

Item	Description	Qty	Unit Price		Total Price	
			F/C	FJD	F/C	FJD
1.	As listed under Section 4 - Employer's Requirements: Part I – Scope of Works					

13.0 TOOLS and EQUIPMENT TO BE SUPPLIED

Bidder to supply the following tools and equipment with the switchgear.

Item No.	Description	Model No.	Manufacturer
1.	1 x Circuit Breaker Timing Test Set		Megger or DV power
2.	2 x Cordless Ratchet Wrench		Milwaukee, Dewalt, Makita

14.0 TOOLS & EQUIPMENTS REQUIRED FOR THE SITE TESTING AND COMMISSIONING

During the pre-commissioning and commissioning tests, a lot of specialized tools and equipment will be required to carry out the acceptance testing. These are the tools which will be used for commissioning switchgear.

Note: EFL has the following test sets: Megger S1-1068, Ductance Tester DV Power (100A), AC/DC Pressure Test set (Baur PGK 70/2.5 H), Omicron CPC 100, CMC 256. Other test sets requested for sit testing works will be required to be supplied by contractor.

Item No.	Description	Model No.	Manufacturer

14.1 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, labour 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.

14.2 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.

14.3 Labour

Payment of labour shall be in accordance with the table of hourly rates below which shall include Contractor's profit, overheads, superintendence, insurance, 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 F/C	Rate/hour FJD

Section 7 - Schedules – Part II: Schedules of Supplementary Information

15.0 WORK PROGRAMME

The bidder is required to state the commencement and completion dates for the following tentative work programme based on an assumed contract signing date of 20th November, 2023. The contractor is to also submit a Gantt chart for the programme outlining the activity, duration, start date, completion date, milestones, resources, etc.

	Component	Start Date	Finish Date
	Design of plant and equipment and approval by employer		
	Manufacture of plant		
	Testing at Manufactures premises (factory acceptance testing FAT)		
	Shipping of plant and equipment		
	Installation of switchgear		
	Completion of wiring for controls and protection equipment		
	Inspection and pre-commissioning tests		
	Testing and commissioning		
	Handover as-built drawings and documentation		

Note that the items in the work programme are the responsibility the contractor. Certain items which have been omitted, such as removal of existing switchgear panels, and cable terminations will be carried out by the Employer. 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.

16.0 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 Bid price shall not be inserted.

Section	Clause No.	Proposed Deviations

17.0 BIDDER'S STATEMENT OF EXPERIENCE

Bidder shall state hereunder a brief resume of his experience in the design, supply and erection of 33kV indoor switchgear, stating the employer's name, contact person, telephone number and fax number.

18.0 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 the 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.

19.0 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.

Designation	Qualification/Experience	No. Required	Period

20.0 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

As a minimum, the following documents & drawings shall be submitted with the Bid.

1. Detail layouts of Indoor switchgear.
2. Single line diagrams.
3. Manufacturer's Technical Brochures type number, reference number and Drawings showing details of construction and dimensions of circuit breakers, current transformers, voltage transformers, transducers and other major equipment.
4. Typical arrangement drawing of control, metering and relay panel.
5. Diagrams indicating functions of Control & Protection LED's in each bays.
6. Protection block diagrams and typical diagrams of unit protective equipment
7. Independent type test certificates for,
    i. 36 kV Indoor Circuit Breakers
    ii. Current Transformers.
    iii. Voltage Transformers.
8. General bar chart of the design, manufacturing, shipping, erection and commissioning schedule.
9. Evidence of Bidder's experience in works similar to this.
10. Certificates issued by an independent International Organization to ensure compliance with the ISO 9001:2000 standards by Bidder.
11. List of standards the Bidder intends to follow.
    i. Descriptive information for equipment being offered including:
    ii. List of recommended spare parts with prices.
    iii. List of special tools or fixtures required for installation, testing, maintaining and operating the equipment
    iv. List and cost of special tools, lifting devices required for installation, operation and maintenance.
    v. List of exceptions to and deviations from this specification. All exceptions shall be clarified and separately itemized. It shall not be necessary for the employer to examine the standard literature and documents of the manufacturer to determine the existence and extent of any exceptions or deviations from this specification.
    vi. Evidence of field service experience of main equipment.

20.1 EVALUATION OF BIDS

This section provides information to the bidder of the bid screening and evaluation criteria for the bids.

20.1.1 SCRENING CRITERIA

The screening criteria for the bids when opening of the technical proposals will be as stipulated in Section 1 (Instruction to Bidders), Clause 13.2 (i) – (xiv). The financial proposals for those bids will be opened which have passed the technical proposal screening criteria and meet the cut-off mark in the evaluation of the Technical Proposals.

20.1.2 EVALUATION CRITERIA

The following criteria with corresponding scoring and weightings which will be utilised for evaluating the bids forms the Technical Evaluation Section.

Tender Evaluation Criteria	
Category	**Criteria**
Bid Responsiveness	General responsiveness of bid, compliance to submission requirements and documentation
Health, Safety & Environment	Assessment of Tenderer's compliance to health, safety and environmental requirements detailed within the technical specification. Past performance of Tenderers. Manufacturer and tenderer holds third party accreditation to ISO 14001 and ISO 45001.
Quality Assurance	Manufacturer holds third party Quality Assurance accreditation to ISO/AS/NZS 9001:2015. Tenderer has Quality Management systems in place that are acceptable to Energy Fiji Limited.
Technical Compliance	Does the Tender meet Energy Fiji Limited's minimum technical requirements as outlined in the Technical Specification? • Design of equipment and all components • Performance of equipment and all components • Sustainability and ease of operation • Reliability data • Independent accreditation and type test certification • Comprehensiveness of proposal, composition of tender's team • Risk management plan and mitigation of foreseeable risks • Past experience in delivering similar project
Commercial Compliance	Tenderer holds the required current insurance provisions and has provided evidence through valid insurance certificates of currencies. Has the Tenderer submitted Departures to the Terms and Conditions? If so is it likely that Energy Fiji Limited will be able to negotiate agreement without undue delay? Assessment of the Tenderers operational risks including conflicts of interest. Tenderer must comply with statutory requirements, such as that enforced by FRCS, FNPF, FNU, etc. and provide evidence of compliance as required in the specifications.
Energy Fiji Limited Procedures	Tenderer must comply with all relevant Energy Fiji Limited safety and environmental procedures. This is indicated by the Tenderer signing the Form of Tender Schedule, acknowledging all applicable procedures.

Tender Evaluation Criteria	
Category	**Criteria**
Bid Responsiveness	General responsiveness of bid, compliance to submission requirements and documentation
	Tenderer must also comply with the requirements of Electricity Act (2017), Electricity Regulations (2019).
Financial Stability	Assessment of Tenderer's current financial stability and ability to remain financially stable.
Price Evaluation	• Base tendered prices; • Price escalation formula (foreign exchange and commodity based rise and fall formula or similar review mechanism); • Other value adding options.

Section 8: Drawings

The following drawings are part of the tender package:

Drawing Title:

1. Old Kinoya Substation 33kV Protection Single Line Diagram for 33kV Switchgear Installation Works.

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 16th July, 2025.

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

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.