ENERGY FIJI LIMITED

TECHNICAL SPECIFICATION

NATADOLA SUBSTATION 33kV SWITCHGEAR REPLACEMENT

TENDER NO: MR 192/2018

Invitation for Bids

Date : **12th May, 2018**
Tender No : **MR 192/2018**

Energy Fiji Limited ("the Employer") invites sealed bids from reputable companies to **complete design, manufacture, supply, testing, and shipping, transportation to site, installation and pre-commissioning of 33kV switchgear Replacement at Natadola 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

Tuvitu Delairewa
General Manager Commercial
2 Marlow Street, Suva, FIJI.
Phone: 679 3224 185
Facsimile: 679 331 1882
Email: TDelairewa@efl.com.fj

Mandatory Site visit at **11am on Thursday, 17th May, 2018** will be held at EFL's Natadola Substation, Sigatoka (Vitilevu) 1 hour drive from Nadi Airport with EFL representatives.

Deadline for submission of tenders shall be 1600 hours local Fiji Time on **Wednesday, 30th May, 2018.**

During evaluation of tenders, EFL will 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 the Design, Manufacture, Supply and Installation and commissioning of 33kV Switchgear Replacement at Natadola Substation and remove and transfer old switchboard to Navutu Depot, Lautoka to 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 10 months from the date of commencement of the Works which is the date of contract sign-off.
2. Source of Funds	2.1	Energy Fiji Limited has a capital works program which is self-funded and intends to use part of the funds for the contract ("the Contract") for which this Invitation to 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.

8. Mandatory Site Visit

8.1 The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the design-build and completion of the Works. The costs of visiting the Site shall be at the bidder's own expense. The site can be visited on the following date and locations at:

11am on Thursday, 23rd May, 2018, at Natadola Substation.

8.2 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the bidder, its personnel and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the inspection.

B. Bidding Documents

9. Content of Bidding Documents

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

		Invitation for Bids
Section	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

9.2 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.

10. Clarification of Bidding Documents

10.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing by fax, or email at the Employer's address 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.

11. Amendment of Bidding Documents

11.1 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.

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

11.3 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

12. Language of Bid

12.1 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.

13. Documents Comprising the Bid

13.1 The bid submitted by the bidder shall comprise of a single envelope containing tender proposal.

The technical proposal shall contain the following:

13.2
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 times
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.

14. Bid Form and Price Schedules

14.1 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 15 and 16.

15. Bid Prices

15.1 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.

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

15.3 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 DDU 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 Authority, 5th Floor Dominion House, Suva, Private Mail Bag, 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

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

15.5 Prices quoted by the 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.

16. Bid Currencies

16.1 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.
	16.2	Bidders shall not indicate there any foreign currency requirements in the Appendix to Price Proposal as the price is fixed lump sum.
	16.3	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.
17. Bid Validity	17.1	Bids shall remain valid for a period of 120 days after the date of opening of technical proposals specified in Sub-Clause 26.1.
	17.2	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 or by cable. 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.
18. Alternative Proposals by Bidders	18.1	Bidders wishing to offer technical alternatives 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.
19. Format and Signing of Bid	19.1	The bidder shall prepare one original and 1 copy of the bid, clearly marking each one as: "ORIGINAL TENDER PROPOSAL" and "COPY OF TENDER PROPOSAL". In the event of discrepancy between the original and any copy, the original shall prevail.
	19.2	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.

19.3 The bidder shall provide one softcopy (in a CD format) of the Technical and Financial proposals

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

19.5 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

20. Sealing and Marking of Bids

20.1 The bidder shall seal the original copy of the bid, and the copy of the bid in separate envelopes clearly marking each one as: "ORIGINAL TENDER PROPOSAL" and "COPY OF TENDER PROPOSAL".

20.2 The bidder shall seal the original bids and copy of the bids in an inner and an outer envelope, duly marking the envelopes as "ORIGINAL" and "COPY".

20.3 The inner and outer envelopes shall

(a) be addressed to the Employer at the following address: Tuvitu Delairewa
General Manager Corporate Services
2 Marlow Street, Suva, FIJI.
Phone: 679 3224 185
Facsimile: 679 331 1882
Email: TDelairewa@efl.com.fj

And

(b) bear the following identification:

- Bid for: Natadola 33kV Switchgear replacement
- Bid Tender Number: **MR XXX/2018**
- DO NOT OPEN BEFORE 31st May**, 2018.**

20.4 In addition to the identification required in Sub-Clause 20.3, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause 22.

20.5 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

21. Deadline for Submission of Bids	21.1	Bids must be received by the Employer at the address specified above no later than 1600 hours local Fiji Time on **Wednesday, 30th May, 2018.**
	22.2	The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause 11, 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.
22. Late Bids	23.1	Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 21 will be rejected and returned unopened to the bidder.
23. Modification and Withdrawal of Bids	23.1	The bidder may modify or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.
	23.2	The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause 21, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.
	23.3	No bid may be modified by the bidder after the deadline for submission of bids, except in accordance with Sub-Clauses 23.2 and 28.2.
	E.	**Bid Opening and Evaluation**
24. Opening of Technical Proposals	25.1	The Employer will open the bids, including modifications made pursuant to Clause 23, at the earliest suitable date and time after closing of the bids, at the following location: *Energy Fiji Limited* *2 Marlow st,* *Suva, Fiji*
25. Process to Be Confidential	25.1	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.
26. Clarification of Bids and Contacting the	26.1	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

Employer		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 28.
	26.2	Subject to Sub-clause 27.1, 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.
	26.3	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.
27. Preliminary Examination of Bids and Determination of Responsiveness	27.1	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 15; and (vi) provides any clarification and/or substantiation that the Employer may require pursuant to Clause 26.
	27.2	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.
	27.3	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.
28. Correction of Errors	28.1	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.

28.2 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 in accordance with Sub-Clause 17.6 (b).

29. Conversion to Single Currency

29.1 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.

30. Evaluation and Comparison of Bid

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

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

30.3 The Employer will carry out a detailed evaluation of the 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.

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

(a) **Contractual and commercial deviations:** The evaluation shall be based on the evaluated cost for fulfilling the Contract in compliance with all commercial, contractual and technical obligations under this 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.

30.5 (a) Any adjustments in price which result from the above procedures shall be added, for purposes of Comparative evaluation only, to arrive at an "Evaluated 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 37 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.

31. Domestic Preference	31.1	No preference shall be given for domestic contractor or joint venture partners.
	F.	**Award of Contract**
32. Award	32.1	Subject to Clause 35, 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.
	32.2	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.
33. Employer's Right to Accept any Bid and to Reject any or all Bids	33.1	Notwithstanding Clause 32, 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.
34. Notification of Award	34.1	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").
	34.2	The notification of award will constitute the formation of the Contract.
	34.3	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
35. Signing of Contract Agreement	35.1	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.
	35.2	Within 28 days of receipt of the Form of Agreement, the successful bidder shall sign the Form and return it to the Employer.

36. Performance Security

36.1 Within 28 days of receipt of the notification of award from the Employer, the successful 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.

36.2 Failure of the successful bidder to comply with the requirements of Clauses 35 or 36 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security.

37. Corrupt or Fraudulent Practices

37.1 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;

37.2 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.

PART 1 - SCOPE OF WORKS

1.1 GENERAL DESCRIPTION

The scope of works for this contract for NATADOLA Substation is to remove the existing switchgears after transfer of the switchboard to new at a height 1.0m above current plinth. Contractor to design, supply and mount the plinth structure.

AND for the complete design, manufacture, supply, delivery, insurance to site, installation and commissioning of Four (4) 33kV indoor switchgears with spring charge/actuators, controls and SEL protection relay panels for the installation of the new switchgear.

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

1. 33kV Indoor switchgear at Natadola Substation will comprise of:

   2 Nos Line feeder bay
   2Nos Transformer bay
   1 No. 2000A rated indoor busbar

2. Control, Metering, Monitoring and SEL Protection Equipment, etc.
3. Spare Parts
4. One (1) Meter Raised Platform for the New Switchgears

1.2 MAJOR PLANT & MATERIAL INCLUDING SPARE PARTS

1.2.1 Indoor 36kV Switchgear

1.2.1.1 Feeder

2 No. 1,250A, 36 kV, 31.5 kA, 3 phase circuit breaker complete with HV housing panel
2 No. Three phase voltage transformers, 25VA ratio 33,000/V3:110/V3:110/3 V Class 0.2 for Metering and Protection with Resistors and VT guard
4 No 33 kV Current Transformers with following cores:
- 1 No. Class PX, ratio 800/600/300:1 A for Protection (O/C & earth fault)
- 1 No. Class 0.1PX, ratio 800/600/300:1 A for Line Differential
- 1 No. Class 0.1PX, ratio 2000/1000:1A for Bus Zone Protection
- 1 No. Class M, ratio 800/600/300:1A for metering 0.2 accuracy

Circuit Breaker Control / Indication

1 – CB control switch (Trip/N/Close)
1 - 3 position local/test/remote selection switch
3 - Circuit breaker indicating lamps, one red (closed), one green (open), one amber (Protection trip)
1 - Trip circuit healthy' lamp white with test push button
2 - Set of CB auxiliary switches
1 - Set of control, indication and alarm circuits with auxiliary relays to suit (if required)
1 - Cable termination chamber with brass wiping gland for the 33kV power cable.
1 – Multi core cable termination chamber for control cable
1 - Anti-condensation heater and circuit breaker
1 - Heater switch

Remote closing and tripping to be done using the SEL311L and SEL351S relays.
All SEL relays shall be wired through the individual MMLG02 test block.
Bus Zone protection to be wired through test block.

1.2.1.2 Transformer Bays comprising

2 No.		1,250A, 36 kV, 31.5kA, 3 phase circuit breaker complete with housing LV panel
2 No.		Three phase voltage transformers, 25VA ratio 33,000/V3:110/V3:110/3 V Class 0.2 for Metering and Protection with Resistors and VT guard
4 No.		33 kV Current Transformers with following cores:
	1 No.	Class PX, ratio 600/300/150:1 A for Protection (O/C & earth fault)
	1 No.	Class 0.1PX, ratio 2000/1000:1 A for Bus Zone Protection
	1 No.	Class 0.1PX, ratio 600/300/150:1 A for Transformer Differential
	1 No.	Class 1M, ratio 800/600/300:1A for transformer metering
1 No		MVAJ13 for Master Trip Relay for Transformer Bay Breaker
1 Lot		VAMP Protection

Circuit Breaker Control / Indication

1 – CB control switch (Trip/N/Close)
1 - 3 position local/test/remote selection switch
3 - Circuit breaker indicating lamps, one red (closed), one green (open), one amber (Protection trip)
1 - Trip circuit healthy' lamp white with test push button
2 - Set of CB auxiliary switches
1 - Set of control, indication and alarm circuits with auxiliary relays to suit (if required)
1 - Cable termination chamber with brass wiping gland for the 33kV power cable.
1 – Multi core cable termination chamber for control cable
1 - Anti-condensation heater and circuit breaker
1 - Heater switch
Remote closing and tripping to be done using the SEL387E and SEL351S relays.
All SEL relays shall be wired through the individual MMLG02 test block.
Bus Zone protection to be wired through test block.

1.2.1.3 Local and Remote Metering

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

a) Transformer panel where Current, Circuit Voltage and Bus Voltage indicators shall be provided using NEMO HD+f digital meter(s) or equivalent.
b) Feeder panel where, Current, Circuit Voltage, Bus Voltage and Watt (MW) indications shall be provided using NEMO HD+ of digital meter(s) or equivalent.

1.2.2 33kV Relays

All protection relays shall be SEL including 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.

1.2.2.1 33kV Protection relays

4 Nos	SEL 351S
2 Nos	SEL 311L
2 Nos	SEL 387E
2 Nos	MVAJ13
4 Units	VAMP 321 for Arc Flash Protection

1.2.2.2 Energy Metering

Shall be installed on the transformer 33kV panel for energy metering (local and remote).

1.2.3 Installation and Other Services

Training on Indoor 33kV Switchgears

Basic Contents:

- Installation of switchgears.
- Testing & commissioning of switchgears.
- Testing of electrical and mechanical interlocking schemes.
- Maintenance practices for the supplied equipment as recommended by the Manufacturer
- Hands on training on test equipments, which are required for maintenance of installed equipment
- Hands on training on periodic adjustment required, and parts replacement procedure in Circuit breaker mechanism.

Switchgear Installation

It is the contractor's responsibility to remove the existing switchgear and install the new switchgear. The contractor shall transport the existing switchgear to Navutu, Lautoka and transport the new to the site. The contractor shall install the new switchgear, carry out all control wiring, terminate all HV cable to the switchgear and carry out all necessary testing's and commissioning works prior to handing over to EFL.

It shall be contractor's responsibility to Program the protection relay settings on the SEL relays, communications processors (SEL3530) and the connection to the SCADA switches installed at Vatuwaqa Substation will be carried out by the Contractor. Approval by EFL Protection and ICT Engineers prior to the loading and testing of the relays and schemes shall be required.

Contractor shall carry out any necessary civil works, if required, for the installation of the switchgear.

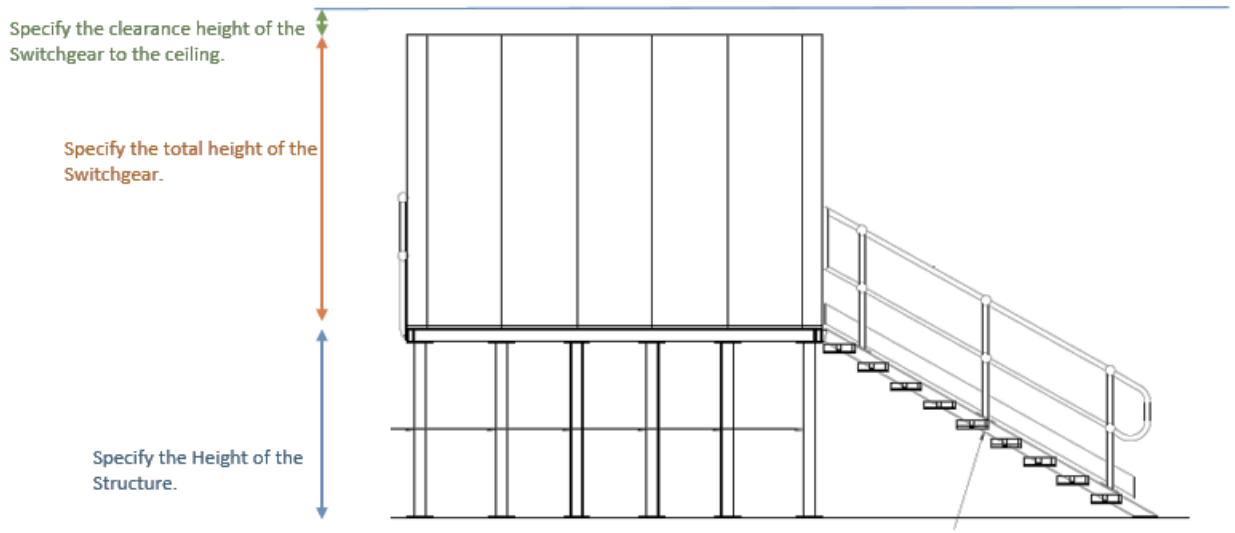
1.2.4 **Raised Platform**

The New Switchgears will be installed on a raised platform of one meter, which the bidders have to supply with. This platform have to be durable, of strong design and have enough space for personnel's to carry out all necessary works on the breaker such as its maintenance.

Bidder has to supply with an initial design drawing of the platform, material characteristics such as the type and overall dimensions. There has to be earthing provision for the platform as well as steps and railing.

While submitting the tender, ensure the below dimensions are clearly specified.

Bidders has to ensure that the switchgear height, from the raised platform, to the ceiling level clearance is within the AS/NZ electrical standard.



Section 1
Technical Specifications

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1 GENERAL INFORMATION

1.1 EXTENT OF CONTRACT

This Contract includes the design, manufacture, inspecting and testing, insurance, packing for export, shipment to Lautoka Port, Transportation to Natadola 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 two 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.

1.2 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.

1.3 ELECTRICAL DESIGN CRITERIA

1.3.1 System Conditions

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

	33 kV	**11 kV**
Normal system voltage	33 kV	11 kV
System Highest voltage	36 kV	12 kV
Frequency	50 Hz	50 Hz
Earthing of Neutral point	Earthed through earthing Transformer	Directly earthed with or without resistor
Design Symmetrical fault level	1125 MVA	250 MVA
	31.5 kA	31.5 kA

1.3.2 Service Conditions

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

Daily average ambient temperature	32ºC
Max ambient temperature	40ºC
Annual average ambient temperature	30ºC
Minimum ambient temperature	50ºC
Relative Humidity	90%
Altitude	100m
Maximum Wind Speed (under cyclonic conditions)	70m/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.

1.3.3 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

1.3.4 Minimum Power Station Clearances

12kV Air insulated indoor busbars and connections shall have electrical clearances as listed in the following table:

Minimum clearance between live metal and earth	120 mm (IEC 60071-2)
Minimum clearance between live metal of different phases	120mm (IEC 60071-2)
Minimum safety clearance between the nearest point not at earth potential of an insulator to ground (Pedestrian Access)	250 mm
Minimum safety clearance between live metal and positions to which access is permissible with other conductive equipment	2590 mm

1.3.5 Pollution levels of Insulators and Bushings

For Grid Power Stations - 31mm/kV

1.3.6 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.

1.3.7 Inter-Changeability

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

1.3.8 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.

1.3.9 Ventilation

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

1.3.10 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.

1.4 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.

1.5 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 (Chapter 180) – 1985
Health and Safety at Work Act – 1996
Environment Management Act

In order to achieve Regulatory compliance under the Act, the Works shall comply with the Electricity Regulations and AS/NZS 3000:2000 “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	
AS/NZS	2373	Electric cables – Twisted pair for control and protection circuits
AS/NZS	2650	Common specifications for high-voltage switchgear and control gear 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 Ed. 2.0 b:2002	Live working - Conductive clothing for use at nominal voltage up to 800 kV a.c. and +/- 600 kV d.c.
IEC	60896	Stationary Lead-Acid Batteries
IEC	60898	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations
IEC	60909	Short-circuit current calculation in three-phase AC systems
IEC	60934	Circuit breakers for equipment
IEC	61009	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)
IEC	61089	Round wire concentric lay overhead electrical stranded conductors
IEC	61232	20SA/A Aluminium clad wires for electrical purposes
IEC	61477 Ed. 1.2 b:2005	"Live working - Minimum requirements for the utilization of tools, devices and equipment"
IEC	61634	High-voltage switchgear and controlgear - Use and handling of sulphur hexafluoride (SF6) in highvoltage switchgear and controlgear
IEC	61660	Short-circuit currents in DC auxiliary installations in power plants and 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

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 100 Standard Dictionary of Electrical and Electronic Terms
ANSI/IEEE Std 1050 Guide for Instrumentation and Control Equipment Grounding in Generating Stations
ANSI/IEEE Std 1100 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
ANSI/IEEE Std 141 Recommended Practice for Electrical Power Distribution for Industrial Plants
ANSI/IEEE Std 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems
ANSI/IEEE Std 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
ANSI/IEEE Std 367 Recommended Practice for Determining the Electric Power Station Ground Potential Rise and Induced Voltage from a Power Fault
ANSI/IEEE Std 399 Recommended Practice for Industrial and Commercial Power Systems Analysis
ANSI/IEEE Std 446 Recommended Practice for Emergency and Standby Power Systems
ANSI/IEEE Std 450 Recommended Practice for Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and 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.

1.6 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.

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 conceptional design, detailed designs, technical submissions, design, manufacture and construction drawings, etc. for approval at each stage until the completion of the project.

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

1.7 DESIGN REVIEW

EFL will require **one (1)** 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, and 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.

1.8 INSPECTION AND TESTING

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

EFL will require **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 Equipments 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, and 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.

1.9 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.

1.10 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.

1.11 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 CD in AutoCAD format 2012 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:

1.11.1 Plant Specification and Description

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

1.11.2 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.

1.11.3 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.

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

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.

1.12 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.

1.13 SITE CONDITIONS

The tenderer is required to ascertain for himself the Site Conditions, including limitations of space, geographical, climatic or other considerations. The tenderer shall satisfy himself of the suitability of the Sites for the erection of the plant and equipment to be supplied.

1.14 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 use install vibrator 5G rated monitors on each panel and inspect with EFL representative on arrival of shipment at Natadola 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.

1.15 PROGRAMME AND PROGRESS OF WORK

1.15.1 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.

2 SWITCHGEAR

2.1 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.

2.2 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 Power 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	36kV, 3 phase, 3 wire, 50Hz
Switchgear Type	Indoor, air insulated, metal-clad, floor mounted. Dead-front, withdrawal or fixed type Vacuum circuit breakers
Rated Lightning impulse withstand	75kV peak
Rated 1 minute power frequency withstand	28kV 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	IP65
Operating mechanism	Magnetic Actuator / spring charge
VAMP321 Arc Flash Protection	Bus bar Protection
With optic fibre	Circuit breaker area protection
Opto link and sensor fibre	Cable area protection
Initiates to trip using Overcurrent Relay	

2.3 DESIGN AND CONSTRUCTION

2.3.1 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) Thermal rating for all current carrying parts shall be a minimum of one second for the rated symmetrical short circuit current. If the maximum short circuit time must be extended, the I2 x t value shall remain constant.

f) 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.

g) 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

h) 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.

i) 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.

j) 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.

k) 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.

l) 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.

2.3.2 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 IP 41 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 equipments.

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.

2.4 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) Fortress key from UK is mandatory and shall be installed in each circuit breaker for feeder and bus bar earthing. Bidder shall supply model and more information in its submission.

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

d) 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.

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

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

2.5 CIRCUIT BREAKERS

a) Vacuum circuit breakers with totally enclosed and maintenance-free contact system with actuator node of closing shall only be acceptable.

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:

(i) Normal Service (connected)

(ii) Disconnected (Isolated)

(iii) Withdrawn, or other if it is fixed type

(iv) Circuit Earth

(v) Bus Earthed

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 magnetic actuator, stored energy type, 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) Maintenance intervals of circuit breakers shall not be less than 25 full rated short circuit interruptions, 10,000 rated current interruptions, or 5 years, whichever comes first. Replacement of the breaker interrupter must be possible.

g) Spare auxiliary contacts (4 N/O and4 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.

2.6 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.
- Electrical Interlock preventing the closing of transformer circuit breakers without synchronism, except for Dead Bar Close.
- 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.
- Electrical circuit preventing the remote closing of the circuit breaker if it is disconnected.

The following position displays shall be provided for each circuit breaker;

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

2.7 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

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.

2.8 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.

2.9 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.

b) Accuracy classes and burdens shall be in accordance with IEC 60044, 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 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.

2.10 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.

2.11 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.

2.12 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.

2.13 INTERCHANGEABILITY

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

2.14 CONTROL AND INDICATION

2.14.1 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.

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

2.14.2 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.
TEST	: The breaker cannot be operated electrically.
REMOTE	: The breaker can only be operated from the remote control room location.

2.14.3 Switchgear Indication and Alarm

a) Trip Circuit Healthy lamp (white) and push button with normally open contacts shall be provided connected across trip supply to enable the tripping circuit to be tested while the tripping supply is maintained and the circuit breaker is closed. A resistance shall be included in the circuit to prevent inadvertent tripping of the breaker should the healthy trip lamp become short circuited. Automatic tripping of a circuit breaker shall energise a remote alarm circuit and illuminate the auto trip lamp on the tripped panel. The auto trip lamp shall remain energised until the protection relay has been manually reset.

b) Alarm indications, when initiated by a maintained contact, shall continue until automatically cancelled by the opening of the initiating contact. When initiated by a fleeting contact the indication shall continue until cancelled by hand.

c) Clear and reliable indication shall be provided of the position of the contacts/switches of the primary circuit in case of non-visible contacts. It shall be possible to easily check the state of the position indicating device when operating locally.

2.14.4 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 and shall be of Schneider make.

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.

2.15 EARTHING

a) The switchboard shall be fitted with a copper earth bar of not less than 150mm² section, running the whole length of the switchboard, to which shall be effectively connected all metal parts not intended to be alive.

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.

2.16 LOW VOLTAGE EQUIPMENT AND CONTROL CIRCUITS

2.16.1 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 (2.5mm²)** but single stranded conductors should only be employed for rigid connections which are not subject to movement of vibration during shipment, operation or maintenance. Flexible conductor's equivalent to 30/0.25mm (1.5mm²) 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	DC Indication Circuits
Grey	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 2.5mm² 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.

2.16.2 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.

2.17 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.

2.18 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.

2.19 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.

2.20 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.

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

2.21 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.

2.22 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.

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.

2.23 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.

2.24 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 Apsorption test	ratio > 1.6
Insulation Resistance tests at 5kV	> 10GΩ

2.24.1 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.

2.24.2 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

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.

2.24.3 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 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
- 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

3 PROTECTION, METERING AND CONTROL

All protection relays offered shall be of the SEL make. Protection scheme shall be compatible with the existing Protection system in EFL. The protection relays shall comply with the requirements of BS 142 and as specified in this specification. The Tenderer shall confirm the suitability of the protection schemes and advise preferred settings for each relay by providing appropriate design calculations.

The protection relays for each circuit breaker shall be flush mounted and fitted to the switchgear panel. Relay elements shall be robust and compact in form, but not subject to distortion due to temperature, humidity or other service conditions and shall not mal-operate when subjected to reasonable mechanical shock and the earthquake forces.

Elements shall be arranged for ease of inspection and adjustment. Relay terminals shall be located on the rear of the cases to ensure that no wiring is visible on the panel faces.

Details marked on relay nameplate shall be in the English language. Each relay shall be provided with visual indication of operation so that the station can be satisfactorily run as an unmanned station.

The relays shall have sufficient auxiliary contacts for tripping, remote alarm and future data processing circuits. At least two contacts on all relays shall be self-resetting for trip and alarm and one hand reset for auto trip lamp. The hand reset flag indicator shall be capable of being reset without opening the case or having to enter passwords in the case of SEL relays. However, it shall not be possible to operate any relay by hand without opening the case or in the case of SEL relays the settings shall be password protected.

For distribution feeder protection, over current and earth fault protection shall be implemented using SEL 351-7 relays. CB Fail protection, auto-reclosing and sync-check (where applicable) shall also be incorporated within the same relay.

The following elements shall be made available for the transformer protection:

- Differential protection, which internally facilitate the ratio and vector group compensation.
- Restricted earth fault (REF) protection, which also facilitate internal current transformer ratio compensation.
- Earth fault protection (stand by earth fault for low voltage winding, Neutral earth fault for high voltage winding etc.)
- Backup overcurrent protection
- 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.
- A lockout relay shall be installed to avoid reclosing when a unit protection device has operated. 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. An Areva MVAJ 30 relay shall be used to provide this functionality.

EFL intends to employ a blocking scheme and circuit breaker fail scheme on the 33kV board. The blocking scheme will provide blocks to all incomer instantaneous elements on fault pickup from feeders, auxiliary transformer and the bus section. Circuit breaker fail scheme will only trip the faulty section of the bus and the bus section VCB.

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.

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 test block of type SEL for testing purpose.

The individual SEL relays on each busbar have to be wired up to a SEL3530 relay (with SEL2701 Ethernet card) dedicated for that busbar (2 x SEL3530 in total) using approved SEL connectors. The RTU SEL3530 relays have to be wired to the CISCO switch and will communicate to the NCC via optic fibre/ethernet.

All protection relay alarms, indications and other required information shown in the table of SCADA input output (IO) listing in Part 4 of this Section shall be programmed to be interfaced with the SCADA system.

The SEL relay inputs and outputs shall be used for specific function as outlined in Part 4 of this Section.

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.

4 SUPERVISORY EQUIPMENT

The 33kV switchgears at Natadola 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 fibre 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 SEL3530/68150 communication relay together with SEL2701 Ethernet Card connected on each section of the bus. All the SEL relays connected to each section of the busbar shall be connected to the dedicated SEL3530 communications processor. The two SEL3530 relays used at Natadola Substation will be connected to the existing SCADA termination equipment.

The programming of the SEL protection relays and the SEL3530 communications processor will be EFL responsibilities. 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 Protection shall comply with conformal costing and IEC68150.

1 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	NEMO HD+		
Anti-Condensation heaters			
OPTOLINK	Schneider VAMP		
SENSOR	Schneider VAMP		
Arc flash protection	Schneider VAMP 321		
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		
Transformer lockout relay	Areva MVAJ13R1BB0756F		
Bus zone lockout relay	Areva MVAJ13T1GB0789A		
Test blocks	SEL		

2 TECHNICAL PARTICULARS AND GUARANTEES

2.1 BUSBARS

	Item	*Units*	*Required*
			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)		

2.2 CIRCUIT BREAKERS

	Item	Units	Required 36 kV	Tendered 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	
	- Transformer circuit breaker	A	1600	
	- Bus section circuit breaker	A	2000	
11.	Rated Current at Max. ambient temperature			
	- Line feeder circuit breaker	A		
	- Transformer circuit breaker	A		
	- Bus section circuit breaker	A		
12.	Rated Lightning Impulse Withstand	kA	95	
12.	Rated 1 min Power Frequency Withstand	kV	35	
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	75	
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	
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/GIS	
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		
	(b) Phase to earth	mm		
	(c) Across CB poles	mm		
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	> 10	

2.3 CURRENT TRANSFORMER

	Item	*Units*	*Required* *36 kV*	*Tendered* *36 kV*
1.	Manufacturer			
2.	Type			
3.	Applicable Standards - IEC		60044-1	
4.	Rated secondary current	A	1	
5.	Rated lightning impulse withstand voltage (primary)	kV	75	
6.	Rated Power Frequency withstand voltage (primary)	kV	28	
7.	Rated short-time current			
8.	Protection cores (Transformer Diff):			
	- Rated Primary Current	A	800/600/300:1	
	- 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	800/600/300:1	
	- Accuracy class	Class	PX	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3	
	- Rated Burden	VA	25	
10.	Protection (OC & EF for Transformer) :			
	- Rated Primary Current	A	800/600/100:1	
	- Accuracy class	Class	PX	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3	
	- Rated Burden	VA	Min 25	
11.	Protection cores(Bus Section and Bus Zone):			
	- Rated Primary Current	A	2000/1000:1	
	- Accuracy class	Class	0.1PX	
	- Resistance of secondary winding protection cores at 75°C	Ohms	< 3	
	- Rated Burden	VA	Min 25	
12.	Number of Cores	No.		
13.	Knee point e.m.f. of protection cores	V	Min 450	
14.	Knee point e.m.f. of busbar protection cores	V	Min 415	
15.	Insulation material for windings			
16.	Limits on exciting current	A		
17.	Partial discharge	pC	< 50	

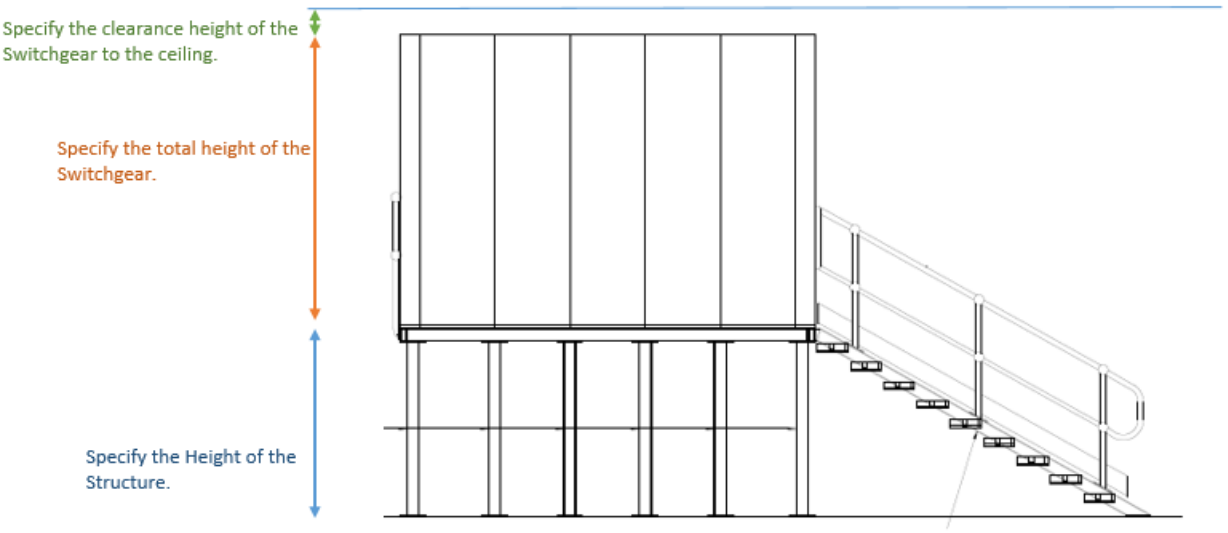
2.4 VOTLAGE TRANSFORMER

	Item	*Units*	*Required* *36 kV*	*Tendered* *36 kV*
1.	Manufacturer			
2.	Type		Magnetic actuator	
3.	Applicable Standards - IEC		60044-2	
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			
14.	Thermal capacity of ground-fault detection winding	A/h		
15.	Rated burden (total on all secondaries)	VA		
16.	Partial discharge		Acc. IEC 60044-4	
17.	Height	mm		
18.	Weight of single pole unit	kg		
19	Burden	VA	25	

2.5 SWITCH PANELS

	Item	*Units*	*Required* *36 kV*	*Tendered* *36 kV*
1.	Manufacturer			
2.	Type			
	rated voltage	kV	36	
2.	Applicable Standards - IEC		IEC 60694	
	Impulse withstand voltage kV peak	kV	75	
	Power frequency withstand voltage	kV	28	
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		
	Is heater switch provided		Yes	
12.	Material			
	Surface Finish			
	Dimensions			
	Length	mm		
	Width	mm		
	Height	mm		
13.	Total Net Weight	kg		

2.6 RAISED PLATFORM



	Item	Required	Units	*Tendered*
1.	Material Characteristic			
2.	Side railings on the Platform & Stairs with railing	Yes		
3.	Height of the Platform	1000mm	mm	
4.	Total Switchgear Height		mm	
5.	Clearance Height of Switchgear to Ceiling		mm	
6.	Bidder to submit drawing of the platform with dimension	Yes		

3 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

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

(a) Detail layouts of Indoor 12kV switchgear.

(b) Single line diagrams.

(c) 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.

(d) Typical arrangement drawing of control, metering and relay panel.

(e) Diagrams indicating functions of Control & Protection IED's in each bays.

(f) Protection block diagrams and typical diagrams of unit protective equipment

(g) Independent type test certificates for,

1) 36 kV Indoor Circuit Breakers
2) Earthing Switches
3) Insulators.
4) Current Transformers.
5) Voltage Transformers.

(h) General bar chart of the design, manufacturing, shipping, erection and commissioning schedule.

(i) Evidence of Bidder's experience in works similar to this.

(j) Certificates issued by an independent International Organization to ensure compliance with the ISO 9001:2000 standards by Bidder.

(k) List of standards the Bidder intends to follow.

(l) Descriptive information for equipment being offered including:

1) List of recommended spare parts with prices.
2) List of special tools or fixtures required for installation, testing, maintaining and operating the equipment
3) List and cost of special tools, lifting devices required for installation, operation and maintenance.
4) 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.
5) Evidence of field service experience of main equipment.

Section 5

Form of Proposals and Appendices

Form of Technical Proposal

To: Mr. Tuvitu Delairewa
General Manager Corporate Services
Energy Fiji Limited
2 Marlow St, Suva
Fiji

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].[*]

We are, Gentlemen
Yours faithfully

Signature _____ in the capacity of _____ duly authorized to sign bids for and on behalf of
_____

Address
_____
_____

[*] 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 accordance 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 and Project Manager	1.1.2.2 & 1.8	Unit Leader Substation, 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	10 months after signing of contract
Electronic transmission systems	1.8	Email & Facsimile
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*	Ten (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	20.3*	Three (3)

Adjudication Board

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. Tuvitu Delairewa

General Manager Corporate Services
Energy Fiji Limited
2 Marlow St, Suva
Fiji

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 and Project Manager	1.1.2.2 & 1.8	Unit Leader Substation, 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 _____

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 Natadola 33kV Switchgear should be designed and executed by the Contractor, and has accepted a Bid by the Contractor for Civil Works and 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: Name _____ Signature _____ Address _____	in the presence of: 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

TABLE OF CONTENTS

1 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.

2 SCHEDULE OF PRICES & CONDITIONS OF PAYMENT

2.1 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.

2.2 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.

2.3 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.

2.4 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

	Particulars	*Milestone*	*Payment (% of contract price)*
A	Plants and Equipment		
A.1	Design Approval of the Switchgear and a letter confirmation for the manufacturing of the switchgear	As per clause 13.2 of Section 3 - Conditions of Particular Application	10% of Plant and Equipment Price
A.2	Delivery of Plant and Equipment to Lautoka Port	After Factory Acceptance Testing	70% of Plant and Equipment Price via normal invoice
A.3	Installation and commissioning of new switchgear	Upon completion of commissioning, rectification of defects and issuing of performance certificate	10% of Plant and Equipment Price through normal invoice
A.4	Retention	12 months after issuing of performance certificate	10%
B	**Labour**		
B1	Installation and Commissioning of new switchgear	Upon completion of commissioning, rectification of defects and issuing of performance certificate	100%
C	Civil Works		
C.1	Manufacture and supply of Platform suitable to at least 1.5m height	After installation of the platform	50%
C.2	All other civil alteration	On a monthly progressive invoice	50%
D	Training	After completion of overseas and Local Training	100%

3 SCHEDULES OF RATES & PRICES

3.1 NOTES ON SCHEDULES OF RATES AND PRICES

1. The Schedules are divided into s separate sections as follows:
    - 3.2 Price Schedule of Main Items
    - 3.3 Alternative Offers
    - 3.4 Recommended Tools & Spare Parts
    - 3.5 Summary of Prices
    - 3.6 Bidders Tools & Equipment
    - 3.7 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.

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

   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.

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

6. 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.

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

3.2 PRICE SCHEDULE ON MAIN ITEMS

ITEM NO.	DESCRIPTION	ESTIMATE QTY	DDU – Off- SHORE Foreign Currency		DDU – ON SHORE FJD		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 phase circuit breaker complete with housing panel (Feeder)	2 Nos								
1.2	1,250A, 36 kV, 31.5 kA, 3 phase circuit breaker complete with housing panel (Transformer Breaker)	2 Nos								
2	**VOLTAGE TRANSFORMERS**									
2.1	Three phase voltage transformers, ratio 33,000/√3:110/√3:110/3 M Class 0.2 for Metering and Protection (2 trx and 2 feeder))	4 Nos								
3	**PROTECTION RELAYS**									
3.1	Areva MVAJ13 Lockout Relay (Transformer Breaker)	2 Nos								
3.2	Test Block (For all SEL Relays)	8 Nos								
3.3	SEL 387E (Transformer)	2 Nos								
3.4	SEL 311L (Feeder)	2 Nos								
3.5	SEL 351S (Feeder, Transformer Breaker) 0351S7X863F1322	4 Nos								
3.6	MVAJ13T1GB0777A (Transformer Bay)	2 Nos								
4	**Arc Flash Protection**									
4.1	Circuit breaker area	4 lots								
4.2	VAMP 321ABGGGDDADBA2	4 Nos								
5	**METERING**									
5.1	NEMO HD+ Transducer	4 Nos								

6	**INSTALLATION**									
6.1	Supply and Installation of 1 meter raised platform	1 Lot								
6.2	Installation of switchgear	1 Lot								
6.3	Testing and commissioning of switchgear (cost of test equipment to be shown separately)	1 Lot								
6.4	SCADA	1 Lot								
6.5	Interfacing 33kV	1 Lot								
6.6	Control cabling from 33kV CBs, Transformer etc.	1 Lot								
6.7	110V DC and 415V AC cabling from board to Switchgear	1 Lot								
6.8	SEL Protection relay programming	1 Lot								
6.9	Removal of Old Switchgear and Transfer to Navutu Depot	1 Lot								
7	**TRAINING**									
7.1	Training at the Switchgear in Fiji	1 days								
8	**MISCELLANEOUS**									
8.2	Design Review at the manufacturers factory	1 set								
8.3	Factory Acceptance Testing (FAT) Witness Testing	2 set								
8.4	Others									
	TOTALS									

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

3.3 RECOMMENDED TOOLS & SPARE PARTS

As per clause 1.10 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

3.4 SUMMARY OF PRICES

	Foreign Cost	Local Cost
1. MAIN OFFER: (a) 33kV Switchgear Replacement (b) Recommended Spares; Tools & Equipment		
2. 1 meter Raised Platform		
Total Cost		

TOTAL CONTRACT PRICE:

Main Offer: Foreign Currency (in words)

……
and Local Currency (in words)

……

Signature of Tenderer .....

Witness .....

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

3.5 BIDDERS TOOLS & EQUIPMENTS

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

Item No.	Description	Model No.	Manufacturer

3.6 RATES FOR VARIATION

The Contractor shall carry out the project without any variations. The project is a Lump Sum fixed Contract.

3.6.1 Materials

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

3.6.2 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

1. 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 21 September 2009. 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		
	Design for the Civil Platform to meet IEC Requirements for building height		
	Manufacture of civil platform		
	Foundation works for the platform		
	Installation of the Platform		
	Testing at Manufactures premises (factory witness testing FAT)		
	Shipping of plant and equipment		
	Installation of switchgear (may be carried out in three stages)		
	Completion of wiring for controls and protection equipment		
	Inspection and pre-commissioning tests		
	Testing and commissioning		
	Removal of the Platform and transfer to EFL Navutu Depot, Lautoka		
	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.

4 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***

5 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.

6 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.

7 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***

8 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

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

(m) Detail layouts of Indoor 12kV switchgear.

(n) Single line diagrams.

(o) 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.

(p) Typical arrangement drawing of control, metering and relay panel.

(q) Diagrams indicating functions of Control & Protection IED's in each bays.

(r) Protection block diagrams and typical diagrams of unit protective equipment

(s) Independent type test certificates for,

6) 12 kV Indoor Circuit Breakers
7) Earthing Switches
8) Insulators.
9) Current Transformers.
10) Voltage Transformers.

(t) General bar chart of the design, manufacturing, shipping, erection and commissioning schedule.

(u) Evidence of Bidder's experience in works similar to this.

(v) Certificates issued by an independent International Organization to ensure compliance with the ISO 9001:2000 standards by Bidder.

(w) List of standards the Bidder intends to follow.

(x) Descriptive information for equipment being offered including:

6) List of recommended spare parts with prices.
7) List of special tools or fixtures required for installation, testing, maintaining and operating the equipment
8) List and cost of special tools, lifting devices required for installation, operation and maintenance.
9) 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.
10) Evidence of field service experience of main equipment.

9 EVALUATION OF BIDS

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

9.1 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 of 60% in the evaluation of the Technical Proposals.

9.2 EVALUATION CRITERIA

The following criteria with corresponding scoring and weightings which will be utilised for evaluating the bids forms the Technical Evaluation Section. Those bids which score above 60% for the Technical Evaluation will be considered for further evaluation, and their financial proposals will be opened. The Financial Evaluation has a weighting of 30% on the overall Value For Money Score (Technical is 70%).

	Criteria for Evaluation	*Weighting*	*Score Range*		
			10 - 8	*7 - 4*	*3 - 0*
1	Manufacturer's years of experience in production of 33kV Switchgear	5.00	Manufacturer has more than 30 years' experience	Manufacturer has less than 30 years' experience	Manufacturer has less than 10 years' experience
2	Manufacturer's experience in Similar projects – Design, Build, Supply and Install	5.00	Company has done more than 50 projects of similar nature	Company has done 20 - 50 projects of similar nature	Company has done less than 20 projects of similar nature
3	Number of years the offered model has been in production and in the market	2.50	Model has been in the market for more than 20 years	Model has been in the market for 15 – 20 years	Model has been in the market for 10 – 15 years
4	offered model sold in Pacific –Fiji/NZ/Australia	2.50	More than 750	Less than 500	Less than 250
5	Number of years of experience of key personnel to be involved in project	2.50	More than 10 years for most of the key personnel	Less than 10 years for most of the key personnel	Less than 5 years for most of the key personnel
6	Manufacturer's Warranty on Switchgear	2.50	More than 4 years	2 – 4 years	Less than 1 year
7	Type test reports on Switchgear	2.50	Results meet and exceed the requirements as per IEC standards	Results do not meet minimum specifications	Type test reports not submitted or not as per IEC standards
8	Conformance to acceptable values for routine tests as specified in tender	2.50	Submits evidence that switchgear will conform &exceed requirements	Submits evidence that switchgear will conform to most requirements	No evidence of conformance to test requirements
9	Electrical Endurance E2 IEC 62271-100	5.00	Electrical Endurance E2	Electrical Endurance E1	Electrical Endurance E0
10	Mechanical Endurance M2 IEC 62271-100	5.00	Mechanical Endurance M2	Mechanical Endurance M1	Mechanical Endurance M0
11	Comprehensiveness of proposed design	2.50	All the design details are addressed as that would be expected in an ideal proposal.	Relevant design details are addressed in terms of design as that compared to an ideal proposal.	Extent of consideration placed into design is significantly less than that expected in a reasonable proposal.
10	Nominal Circuit Breaker parameters	5.00	Circuit breaker parameters exceed the nominal required performance ratings	Circuit breaker parameters are equal to the nominal required performance ratings	Circuit breaker parameters are below the nominal required performance ratings
11	Evaluation of Current Transformers	5.00	Offered CT ratings exceed the specifications	Offered CT ratings are equivalent to the specifications	CTs Offered are below the specification
12	Evaluation of Voltage Transformers	5.00	Offered VT ratings exceed the specifications	Offered VT ratings are equivalent to the specifications	VTs Offered are below the specification
13	Switchgear Panel Evaluation	5.00	Meets all the technical requirements as in the specification. All technical details match with design requirements	Meets only the basic requirements of the specification. Proposed technical data is acceptable but does not match with specification	Meets only the mandatory requirements of the specification
14	Maintenance Requirements for Switchgear	2.50	Needs maintenance every 3 years or more or after 10000 operations	Needs Maintenance every 2 - 3 years	Needs Maintenance every 1 - 2 year

15	Safety Requirements for Switchgear	5.00	Meets and exceeds the safety requirements of the switchgear	Meets most of the safety requirements for the switchgear	Does not meet the level of safety EFLtures for the switchgear
16	Innovation in Design	5.00	High degree of innovation incorporated into design	Evidence of some innovation incorporated into design	No evidence showing any innovation in design
17	Installation of Switchgear and replacement of existing switchgear	2.50	Will require minimal tools and equipment from EFL for installation	Will require some tools and equipment from EFL for installation	Will require all tools and equipment from EFL for installation
18	Delivery period and timeline	5.00	Delivery within 18 - 24 weeks	Delivery period is within 24 - 28	Delivery period would exceed 28 weeks
19	Quality Control	2.50	Manufacturer has quality system in accordance with international standards and produced evidence of regular third party audits	Manufacturer appears to have a quality system in place.	Manufacturer has a record of providing reasonable quality material but provides no evidence of a quality system
20	Proposed Civil Design	10	All civil drawings submitted Submits FIE Certified Engineers and architect requirements	Partial civil drawings Submits FIE Certified Engineers and architect requirements	No civil drawings Does no submits Engineers and architect requirements
21	Civil design meets IEC standard	10	Meets switchgear Manufacturers requirements	Partial requirements met but does not match with civil drawings	Does not meet switchgear Manufacturers and civil requirements
	Total	**100%**			

Tender Submission - Instruction to bidders

It is mandatory for Bidders to upload a copy of their bid in the TENDER LINK Electronic Tender Box no later than **1600hrs, Wednesday 30th May, 2018.**

To register your interest and tender a response, view 'Current Tenders' at: **https://www.tenderlink.com/efl**

For further information contact The Secretary Tender Committee, by e-mail **TDelairewa@efl.com.fj**

In additional, hard copies of the tender, one original and one copy must be deposited in the tender box located at the EFL Head Office, 2 Marlow Street, Suva, Fiji no later than **1600hrs, Wednesday, 30th May, 2018.**

Addressed as:

Tender – MR 192/2018 Natadola Substation 33kV Switchgear Replacement

The Secretary Tender Committee

Energy Fiji Limited

Head Office

Suva

Fiji

Hard copies of the Tender bid will be accepted after the closing date and time provided a soft copy is uploaded in the e-Tender Box and it is dispatched before the closing date and time.

Tenders received after **closing time 1600hrs, Wednesday 30th May, 2018.**

- Will not be considered.
- Lowest bid will not necessarily be accepted as successful bid.
- **It is the responsibility of the bidder to pay courier chargers and all other cost associated with the delivery of the hard copy of the Tender submission.**