FIJI ELECTRICITY AUTHORITY

BIDDING DOCUMENT

Voivoi Substation, Nadi

Design, Supply & Installation of Outdoor Structures and 36kV Electrical Accessories, and installation of free issued 33kV circuit breakers and 33kV Disconnectors

TENDER NO: MR 130/2017

INVITATION FOR BIDS

Date: 07TH JUNE, 2017
Tender No: MR 130/2017

The Fiji Electricity Authority ("The Employer") invites sealed bids from reputable and suitable Bidders for the Electrical/Mechanical Design, Supply and Installation Supply of Outdoor steel structures, 33kV Aluminum 3,000A Bus Bar, 33kV Voltage Transformer and Accessories, conductor jumpers and terminals, above ground earthing installation of equipment supplied by FEA (33kV circuit breakers, 33kV Isolators), for the new Voivoi Substation Project.

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

Bidders may obtain further information from, and inspect and acquire the bidding documents, at

Design, Supply & Installation of Outdoor Steel structures and 33kV Electrical Accessories for Voivoi Substation Project, Nadi

Fiji Electricity Authority
The Secretary Tender Committee
2 Marlow Street, Suva, FIJI.
Suva

The deadline for submission of bids shall be **1600hrs (local time) on Wednesday, 19th July, 2017.**

During evaluation of bids the Authority may invite a bidder or bidders for discussions, presentations and any necessary clarification before awarding the contract price proposal.

Section 1 - Instructions to Bidders

1. Scope of Bid

The Fiji Electricity Authority (hereinafter referred to as "the Employer"), wishes to receive bids for the Design, Supply & Installation for 5 x 33kV Bays of steel structures and 36kV Accessories and 33kV busbar and bar connectors/terminals, 33kV Voltage Transformer/fuse, conductors and all palm terminals, and installation of free issued 33kV circuit breakers and Isolators, earthing of structures and above ground earthing, control cables supply/installation/wiring for the new Voivoi 33kV Substation Project, as defined in these bidding documents (hereinafter referred to as "the Works").

The successful bidder will be expected to complete the Works within 4 months from the date of commencement of the Works.

2. Eligible Bidders

This Invitation to Bid is open to bidders who have sound financial background and have previous experience in handling such civil projects.

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

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

2. Eligible Materials, Equipment and Services

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.

3. Qualification of the Bidder

To be qualified for award of Contract, bidders shall 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.

4. Cost of Bidding

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.

5. Site Visit

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 pre-bid meeting is scheduled on **Wednesday 14th June, 2017 at 11am Voivoi Site** which is just beside the Nadi Airport.

6. Sealing and Marking of Bids

The bidder shall seal the original copy of the technical proposal, the original copy of the price proposal and each copy of the technical proposal and each copy of the price proposal in separate envelopes clearly marking each one as: "ORIGINAL-PROPOSAL", and "COPY PROPOSAL", etc. as appropriate.

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

The inner and outer envelopes shall

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:
TuvituD@fea.com.fj
And

bear the following identification:

- Bid for: Voivoi Substation Design, Supply & Installation of Outdoor Steel structures and 33kV Electrical Accessories.
- Bid Tender Number: **MR 130/2017**
- DO NOT OPEN BEFORE **Wednesday 19th July, 2017**

7. Deadline for Submission of Bids

Bids must be received by the Employer at the address specified above no later than 1600 hours (Fiji Time) **Wednesday, 19th July, 2017.**

The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum, 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.

8. Late Bids

Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 23 will be rejected and returned unopened to the bidder.

9. Modification and Withdrawal of Bids

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.

The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause 22, 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.

No bid may be modified by the bidder after the deadline for submission of bids.

10. Employer's Right to Accept any Bid and to Reject any or all Bids

Notwithstanding Clause 34, 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.

11. Notification of Award

Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder by fax, confirmed by registered

letter, 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").

The notification of award will constitute the formation of the Contract. 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

12. Signing of Contract Agreement

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.

Within 7 days of receipt of the Form of Agreement, the successful bidder shall sign the Form and return it to the Employer.

13. Corruptor Fraudulent Practices

The Employer requires that the Contractor observe the highest standard of ethics during the procurement and execution of such contracts. In Pursuance of this policy, the Employer:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition;

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

Furthermore, bidders shall be aware of the provision stated in Sub-Clause 1.16 and Sub-Clause 15.5 of the Conditions of Contract, Part II - Conditions of Particular Application.

Section 2

Employer's Requirements
Scope of Works
Voivoi Substation, Nadi

Design, Supply & Installation of outdoor 36kV Steel Structures and 36kV Electrical Accessories

SCOPE OF WORKS

GENERAL DESCRIPTION

The scope of works for this contract for the **Design, Supply of materials and Installation of all 5 X 33kV bay equipment's and Earthing of structures for new Voivoi Substation.**

1. 2 feeder bays comprising 2 units 33kV Isolators (FEA free issued HAPAM single break), 2 units 33kV Circuit breaker (FEA free issued HSS Horizon), 33kV steel cable structure and fittings, 33kV single phase Voltage Transformer and steel structure with all fittings, 36kV surge Arresters, mounting and fittings, 33kV SIBA dropouts, conductor (Neon) cabling and pressing of terminals, Earthing copper bar (4x50mm) for each structure and braids 4mmx50mm for all structures, all Electrical terminals shall be rated to 2,000A, 40kA rated, All structural bolts and nuts galvanized grade 8.8.

2. 2 Transformer bays comprising 33kV Isolators (FEA free issued HAPAM single break), 2 units 33kV Circuit breaker (FEA free issued HSS Horizon), 33kV steel cable structure and fittings, 33kV single phase Voltage Transformer and steel structure with all fittings, 36kV surge Arresters, mounting and fittings, 33kV SIBA dropouts, conductor (Neon) cabling and pressing of terminals, Earthing copper bar (4x50mm) for each structure and braids 4mmx50mm for all structures, all Electrical terminals shall be rated to 2,000A, 40kA rated, All structural bolts and nuts galvanized grade 8.8.

3. 1 x Bus Coupler comprising 2 units 33kV Isolators (FEA free issued HAPAM single break), 1 unit 33kV Circuit breaker (FEA free issued HSS Horizon), conductor (Neon) cabling and pressing of terminals, Earthing copper bar (4x50mm) and braids 3mmx50mm for all structures, all terminals (2,000A) rated, structural bolts and nuts,

4. Supply and Installation of 33kV tubular round Aluminum busbar 3,000A bus bar Ø100mm, 40kA and support steel structures, support and cradle insulators and earthing, terminals, conductors.

5. 4 sets of 33kV three single phase Voltage Transformers for feeders and Transformer and Transformer bay.

6. Supply and Laying of all 110V DC Armored control cables completed stainless steel glands and wiring of all terminals from Protection panel to All Plants and equipment in the 5 by 33kV bays

    a. 10 x 33kV motorized Isolators/Disconnectors
    b. 5 X 33kV HSS Horizon Circuit breakers
    c. 4 X 33kV Voltage Transformers
    d. 2 X Auxiliary Transformer 100KVA
    e. Interpanel wiring between Control panels

7. Supply of 4 units 4mm aluminum VT Marshaling box 400mm X 600mm X 150mm depth, bidder to provide drawings and structure to fit on the VT.

8. Bidder to provide control wires from Nexun OLEX and also provide the datasheet for cable glands.

9. All structure to main Ground Earthing – 120mm^2

10. FEA will provide
    a. 5 units 33kV Horizon Circuit breaker
    b. 10 units 33kV HAPAM Disconnector complete with steel structures

Design, Supply & Installation of outdoor 36kV Steel Structures and 36kV Electrical Accessories

No.	Quantity	Description	Supplier	Unit Rate	Total
1	66m	33kV Aluminum Tubular round Bus-bar (3,000A rated 40kA) - Diameter 100mm & Thick 10mm With all lugs, and end caps. 6 x 11m single piece lengths, no joints, , bidder to provide specification and drawings			
2	8	Disconnector Auxiliary Contact			
3	4	Earth Switch Auxiliary Contact			
4	15	SIBA VT Expulsionn Dropout Fuse & Link suitable to the VT provided, , bidder to provide specification			
5	18	33kV Bus-bar Post insulators, bidder to provide specification			
6	4 sets	33kV Voltage Transformers (single Phase) 4sets x 3each =12			
7	12	33kV Surge Arrestors with analogue counter reading , bidder to provide specification			
8	24	33kV Composite Insulator, , bidder to provide specification			
9	18	Dead End Assembly Palm 'TYPE A' for Neon NQ-410, bidder to provide specification and drawings			
10	30	Disconnector Palm 125mm X 125mm, hole center 50mmX50mm, 1600A, 31,5kA bidder to provide specification and drawings			
11	30	Circuit Breaker Palm 125mm X 125mm, hole center 50mmX50mm, 1600A, 31.5kA for Neon , provide specification and drawings			
12	25	Tension Assembly Palm for Neon, bidder to provide specification and drawings			
13	15	T Connector for Ø100mm Tubular Bus- bar, bidder to provide specification and drawings			
14	15	Bus-bar Palm 100mm X 100mm , bidder to provide specification			
15	24	Assembly Palm for Incoming Aluminum XLPE Cable – 300mm^2			
16	24	Bus-bar Craddle, bidder to provide specification and drawings			
17	8 sets	Bus-bar Support Structure, bidder to provide specification and drawings, design at 100m/s cyclone rated			
18	4 sets	Cable Support Structure with supplier design at 100m/s cyclone rated			
19	4 sets	VT & Surge Arrestor Support Structure with supplier design at 100m/s cyclone rated			
20	50 length	Copper Earth Bar 4x50x4000mm, bidder to provide specification and drawings and place of manufacture and weight			
21	80 length	Copper timed braid round 4mm X 50mm X 80cm, bidder to provide specification and drawings			
22	80	Above ground earthing of all 5 bay structures and CAD weld to the main earth Grid			
23	1,000m	2.5mm Control cable Armored , 0.6/1kV, 20 Core			
24	1,000m	2.5mm Control cable Armored , 0.6/1kV, 12 Core			
25	1,000m	2.5mm Control cable Armored , 0.6/1kV, 8 Core			
26	400m	4 mm Control cable Armored , 0.6/1kV, 2Core			
27	200m	35mm^2 415V 4 core orange circular AC cable			

It shall be the contractor's responsibility to install all the equipment and apparatus as per the design. The above list of material is a reference of what shall be procured for this project but the contractor shall review the design and procure the correct sets of materials for this project and this shall be clearly reflected on the bidding document. If not, the contractor shall have to procure the material on their own expense for the installation on this project.

1. **Control Cable Work Scope**
   It shall be contractor's responsibility to lay control cables in the control pits and trenches. The contractor shall work out the lengths of the DC Armoured 2.5mm control cable that are needed, as per the design drawings. The contractor shall also place tags on the control cables to which it indicates where the cable is being terminated at. This also includes AC and DC cable works. The cable shall be laid in an appropriate manner in the trench and no control cable shall be tangles with another cable. In case one cable needs to be pulled out, there shall be no distraction to the particular cable to be pulled out from the trench.

   All control cables shall be tagged at every 2meters and at every trench pit corners. The tagging shall indicate the cable number and at what is the purpose for that cable, example, NB1, NB2, etc.

   All DC wires shall be kept at one side of the trench and all AC wires on the other side. At no circumstances, AC and DC cables shall not get mixed up in the trench.

   In the control building trench, the contractor shall place one cable tray at one side of the trench vertically for DC control cables and one cable tray on the other side of the cable trench, vertically for AC cables. The cable trays shall be earthed as well to the main earth of the control building. All the tray joints shall be earthed as well. There shall be cable identification labels present on the cables as well in the control building.

2. **Outdoor Earthing Works**
   All structures shall be properly earthed as per standard, which includes breakers, isolator structures, cables, etc. to the main earthing grid. It shall be contractor's responsibility to carry out cad welding, if necessary, to all the copper joints for earthing. There shall be copper lugs used for all earthing that includes interior and outdoor earthing's. Earth sleeving shall be used and for outdoor, lugs of size 120mm^2 shall be used.

   For all outdoor structures, which includes breakers, isolator support structures, busbar support structures, cable support structures, etc., the contractor shall use an earth bar, which shall be bolted to the structure, for earthing of the apparatus. There shall be lugs used in all earth bars which shall be properly crimped. The crimped lugs shall then be bolted to the earth bar with the use of stainless steel bolts.

3. **Indoor Earthing**
   All control panel earthing shall be carried out by the contractor. The panel earthing shall be connected to the main earth of the building.

4. **Outdoor Structure Installation**
   It shall be contractor's responsibility to carry out the installation works as per the design proposed. All installation items shall be on contractor's responsibility to procure.

   All structural nits and bolts shall be HD galvanised, whereas all primary HV connections shall be with stainless bolts and nuts. It shall be contractor's responsibility to properly torque all structural bolts and nuts up to the standard.

   All isolator shall be motorised whereas, adjustment shall be properly carried out prior installation, for smooth operation.

   It shall be contractor's responsibility to carry out all preventative rust works in all support structures.

5. **Control Cable Wiring**
   It shall be contractor's responsibility to carry out all control cable terminations at the outdoor structures and indoor panels. This includes the wiring in breakers, marshalling box, isolator panel and control panels in the control room. There shall be proper clear ferrules used for control wire identification.

   All control cable termination shall be carried out using lugs and not bare. It shall be contractor's responsibility to use appropriate lugs for cable terminations. For outdoor:
   a. All wiring shall be 2.5mm^2 boot-lace lugs. This includes wiring in the breakers, marshalling boxes and isolator panels.
   b. All earthing shall be done with copper earthing lugs of 2.5mm^2 ring lugs which shall be connected to the copper bar.

For Indoor:

c. Contractor have to ensure all CT and VT wiring in the relay are by the use of 2.5mm^2 ring lugs.
d. All wiring termination on the terminal strip shall be carried out by the use of 2.5mm^2 boot lace lugs.
e. All earthing shall be with copper earthing lugs of 2.5mm^2 ring lugs which shall be connected to the copper bar.

All lugs shall be colour coded according the control wires, this includes red, blue, black, gray and yellow/green for earthing.

All lugs shall be properly crimped and tightly screwed to the terminals.

6. 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 5 years. The cost of supply of these spare parts shall form part of the contract. The tenderer shall also forward a list of optional spare parts which shall not form part of the contract but should be shown in a separate price schedule.
The successful contractor shall ensure the availability of spare parts for operation and maintenance of all the items of equipment for a period of at least 15 years.

7. Labelling

It shall be contractor's responsibility to place all labelling in the outdoor equipments, such as breaker numbers, isolator numbers, earth switch number, etc. All outdoor labelling shall be have pasted with the use of Bostic Industrial Adhesive. The dimension of the labels shall be given by FEA.

8. Manuals and Maintenance Guidelines.

The contractor shall provide all necessary manuals, maintenance guidelines and operating knowledge of the installed. This includes the manuals and maintenance guidelines of the motorized isolator as well.

Section 3

Form of Proposals and Appendices

SECTION 3

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. **Bidders whose Bids do not contact the data in the required format will be treated as non-responsive.**

1 SCHEDULE OF PRICES & CONDITIONS OF PAYMENT

1.1 *CONTRACT PRICE*

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

The contractor shall fill in the table below for the pricing of the below scope of work.

No.	Scope of Work	Overseas Currency DDU CIF, DAF (Voivoi, Fiji)	Price in VIP FJD
1	Comprehensive Design – electrical and Mechanical fittings with Installation manual and guidelines		$
2	Total cost of supply of all imported overseas outdoor materials inclusive of steel support structures, 33kV Aluminum bus bars and fittings, Voltage Transformers, dropout fuse, conductors (Neon), overhead terminals and palm fittings, control cables, Aluminum box, Surge Arrester, Bushings and Insulators, and all necessary materials.	$	
3	Total Cost of installation of outdoor structures, inclusive of all earthing works and finishing works. This include transportation of 33kV CB and Isolators from Navutu Depot to Voivoi Site		$
4	Total cost of supply and installation/laying/wiring of all control cables with all identification tags as per the tender.		$
5	Total cost of carrying out all conductor and termination works with earthing and all finishing works.		$
	Total Cost of the Project – LUMP SUM		**$**

Section 3

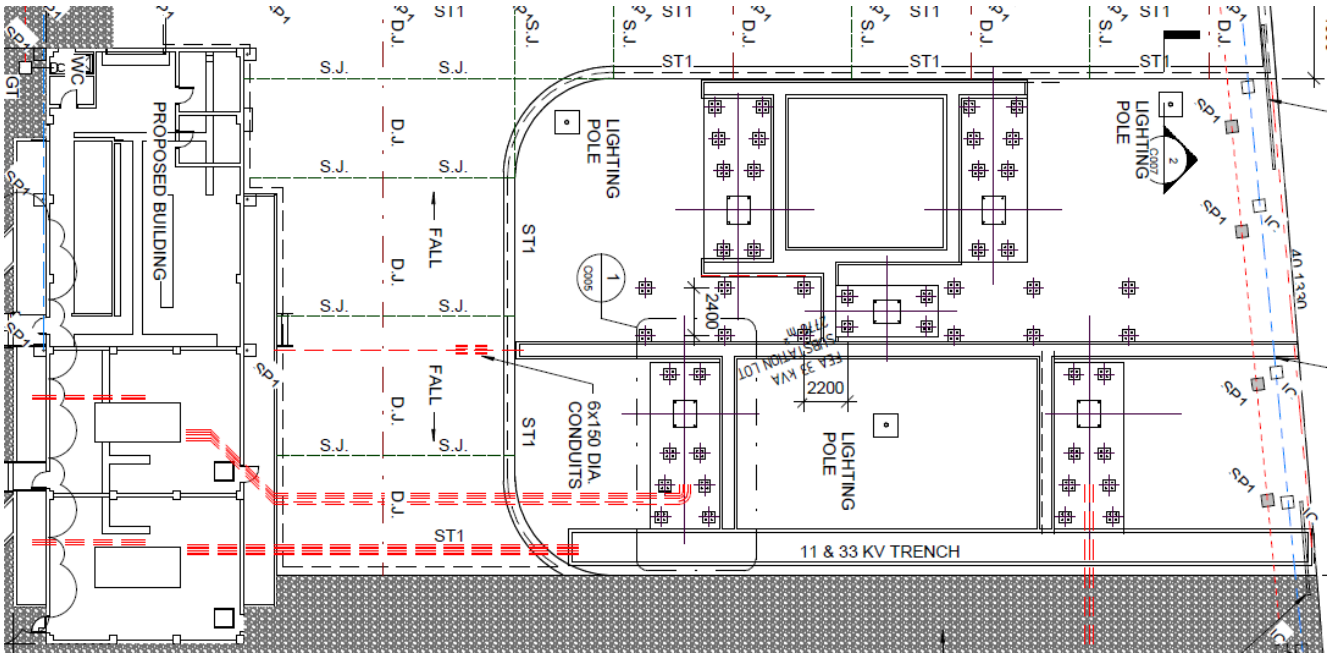
Drawings and Literature

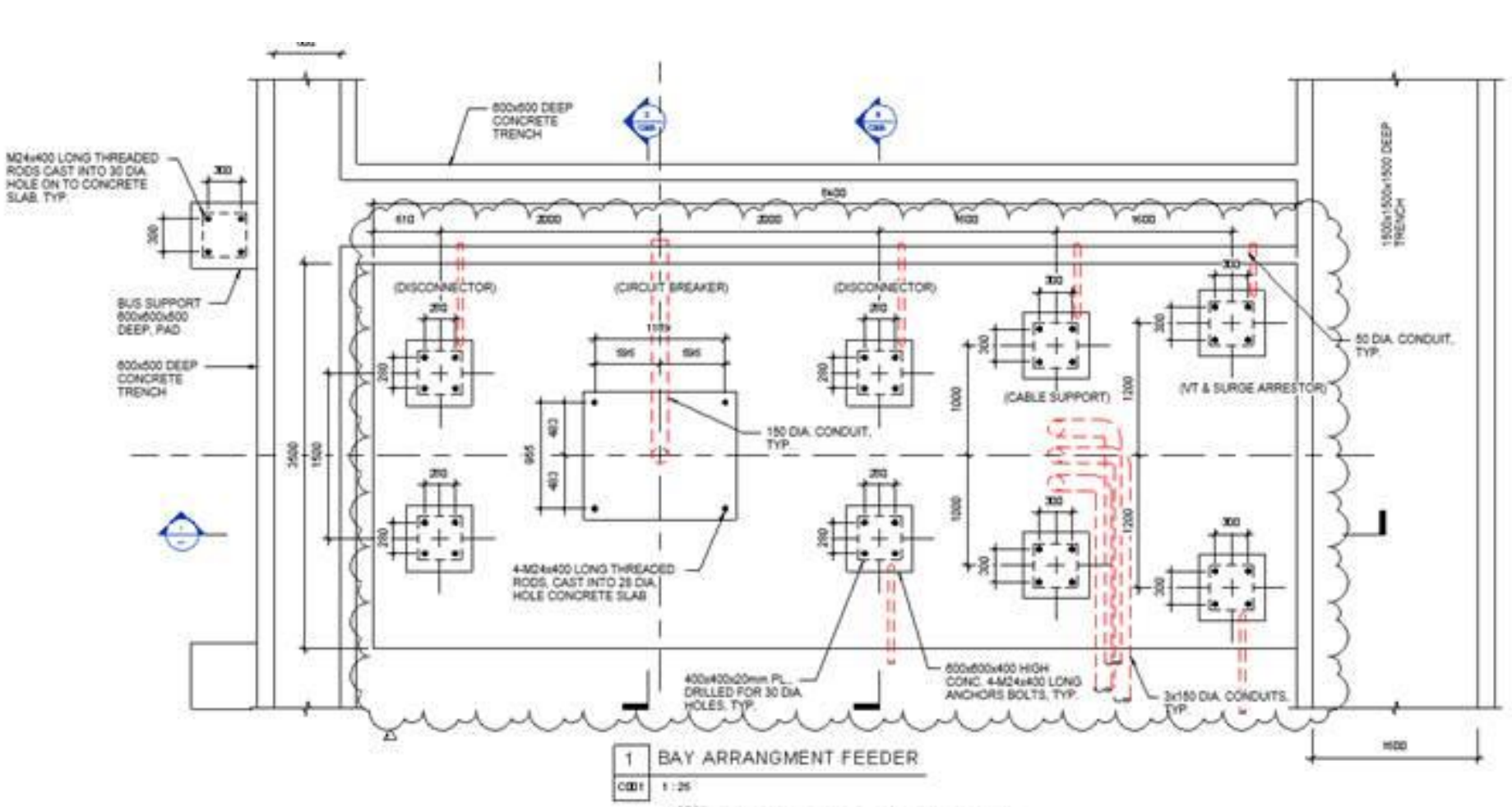
1 OTHER DOCUMENTS & DRAWINGS TO BE SUBMITTED WITH BID

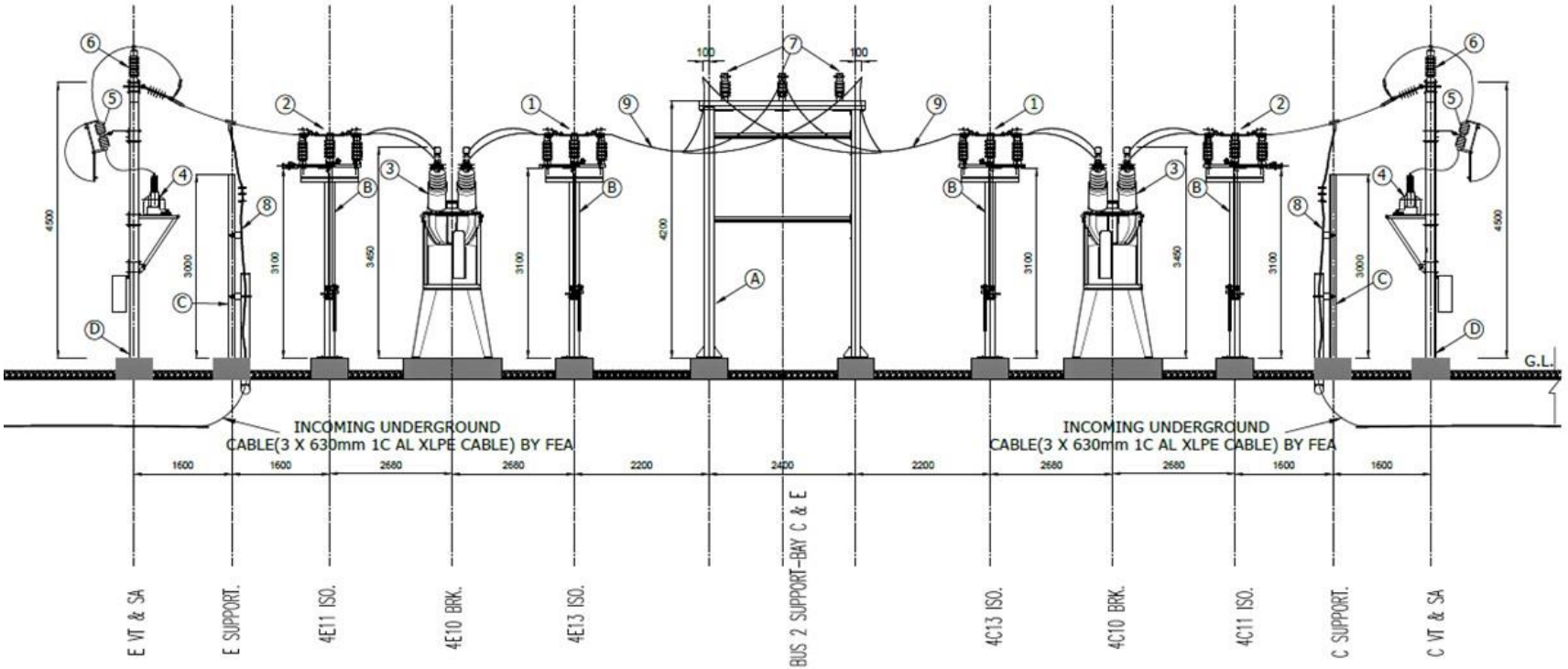
As a minimum and mandatory, the following documents & drawings shall be submitted with the Bid for Evaluation.

1. Comprehensive Proposal of Design
2. Specification and drawings of conductor (neon)
3. Specification and drawings of 33kV Aluminium busbar 100mm, 3,000A, 40kA
4. Specification and drawings of the conductor Terminals, palm terminals for disconnectors, palm terminals for the 33kV circuit breakers, terminals for the bus bar (if welded- details of welding as per proposed design), terminals of the cable connection to the feeder bay and Transformer bay
5. Specification and Drawings of all steel structures
6. Specification and drawings of outdoor 33kV voltage transformer
7. Specification and drawings of dropout fuse
8. Specification and drawings of copper braids and copper bar
9. Specification of110V DC control cables and glands
10. Installation instructions and guidelines
11. Evidence of Bidder's experience in works similar to this
12. List of ASNZ and IEC standards Bus bar welding standards
13. Manuals and guidelines for the equipments
14. Equipment specifications

Section 8 – Drawings







ITEM	DESCRIPTION
	PRIMARY EQUIPMENT
1	33kV RDB DISCONNECTOR
2	33kV RDB DISCONNECTOR WITH E/S
3	33kV CIRCUIT BREAKER WITH CTs
4	33kV VOLTAGE TRANSFORMERS
5	VT DROPOUT FUSE
6	SURGE ARRESTER
7	33kV ALUMINIUM TUBULAR BUSBARS
8	33kV IC 630MM2 XLPE U/G CABLE
9	33kV AAC TRITON CONDUCTOR
A	BUSBAR SUPPORT STRUCTURE
B	DISCONNECTOR SUPPORT STRUCTURE
C	CABLE SUPPORT STRUCTURE
D	VT & SURGE ARRESTER SUPPORT STRUC

No.	*Criteria for Evaluation*	*Weighting*	*Score Range*		
			10 – 8	***7 - 4***	***3 - 0***
1	Comprehensiveness of proposed Electrical and Mechanical design	15	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	Extent of consideration placed into design is significantly less than that expected in a reasonable proposal. Most of the items stated in specifications are
2	Aluminum Bus bar and insulators	15	Specification and Drawings submitted	Partial	No Submission
3	Voltage Transformers, Surge Arrester and SIBA Dropout fuse	5	Offered VT ratings exceed the specifications	Offered VT ratings are equivalent to the specifications	VTs Offered are below the specification
4	Installation	15	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	Meets only the mandatory requirements of the specification
5	Conductor and Terminals	20	Specification and Drawings submitted	Partial	No Submission
6	Steel structure	15	Specification and Drawings submitted	Partial	No Submission
7	Earth proposal and specifications	5	Specification and Drawings submitted	Partial	No Submission
8	110V DC Control cable, glands, boot laces and labeling	10	Specification and Drawings submitted	Partial	No Submission
9	Delivery period and timeline	5	Delivery period is within 20 weeks	Delivery period is within 20 - 24 weeks	Delivery period would exceed 24 weeks
	Total	**100%**			

SPECIFICATION FOR 36 KV VOLTAGE TRANSFORMERS (OUTDOOR TYPE)

SCOPE

This specification covers the Design, Manufacture, Testing and Supply of outdoor 36kV Voltage Transformers which are to be installed on 33kV overhead lines for protection as well as for measuring purposes.

12 units	Single Phase	Outdoor Voltage Transformer with provision for Open Delta Connection and all steel structures, terminal boxes, bolts and nuts and palm terminal connectors suitable for chafer and lime conductors.

SYSTEM PARAMETERS

1. Nominal Voltage : 33kV
2. System highest voltage : 36kV
3. System frequency : 50 Hz
4. Number of phases : 1 phase and 3 phases
5. System fault level : 25 KA

SERVICE CONDITIONS

1. Annual average ambient temperature : 35 degree Celsius
2. Maximum ambient temperature : 42 degree Celsius
3. Maximum relative humidity : 98%
4. Environmental conditions: Humid tropical climate of high pollution level.
5. Operational altitude: Upto 1200m above MSL.

Principal Technical Parameters:

Description	**1 Ø**
Rated System Voltage KV (rms)	33kV
Highest System Voltage KV (rms)	36kV
System Frequency (Hz)	50 Hz
System Neutral Earthing	Solidly Earthed
PRIMARY NEUTRAL	Brought out via a 3.6kV bushing and earthed to the tank via a removable link.
Installation	Outdoor
VECTOR GROUP	
Voltage variation	10%
Voltage Factor	1.9 times for 8 hrs, 1.2 continuous
Rated insulation level	
1.2/50 microsecond impulse withstand outage KV (Peak)	170kV
1 Minute dry & wet power frequency withstand voltage primary (kV rms)	70kV
One min. dry power frequency withstand voltage KV (rms)	3
Power frequency over voltage withstand requirements for secondary winding.	3 KV
Creepage Distance (Heavily polluted atmosphere) Total (mm)	900
Creepage factor (Max.)	4.0
Accuracy metering, protection	0.5, 3P
Primary Side (KV) Ratio	33/ √ 3
Secondary Side (V) Ratio	110 / √ 3
No. of Core	2
Rated Burden	50VA/Ø
Max. temp rise over ambient 60 deg C	As per IEC Standards

APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the standards specified below or subsequent editions and / or amendments thereof.

BS 729 (1971)	Hot dip galvanized coating on iron and steel articles.
IEC 296 (1982)	Insulating Oil for Transformer and Switchgear.
BS 4190 (1957)	Hexagonal Bolts and Nuts.
IEC:60044-2	Specification for Voltage Transformer
IEC-270	Partial Discharge Measurement
IEC-44(4)	Instrument T/F measurement of PDs
IEC-171	Insulation Co-ordination
IEC-358	Coupling Capacitor Divider
IEC-60	High voltage testing techniques
IEC-8263	Method for RIV test on high voltage insulators

BASIC FEATURES

Design

The design features and construction details shall be complete in all respects and shall conform to the modern practice of design and manufacture. The insulation of the instrument transformers shall be so that the internal insulation shall have higher electrical withstand capability than the external insulation. The designed dielectrics withstand values of external and internal insulations shall be clearly brought out in the guaranteed technical particulars. The dielectric withstand values specified in this specification are meant for fully assembled instrument transformer.

The outdoor post-type Single and Three Phase Voltage Transformers shall be designed for the system highest voltage (Rated Voltage) as stipulated

It shall be suitable for operation under the service conditions without protection from sun, rain and dust.

The withstand ability of the primary, the saturation of the magnetic core and the secondary characteristic shall not be less than that requested in the Minimum Technical Requirements

The primary winding of voltage transformers will be connected phase to ground.

All the fuses and the links shall be provided at the V.T terminal boxes with IP65 rated weather proof terminal box for easy access

The design of PT shall be based on following requirements:-

They must transmit sudden drops of primary voltages.

They must have sufficiently low short circuit impedance as seen from secondary.

The temperature rise at 1.1 times rates primary voltages, rates frequency and rated burden, shall not exceed the following values over the above stated maximum ambient temperature.

a)	For winding with class A Insulation immersed in oil (Measured by Resistance Method)	50 degC
b)	Oil at the top of the Tank (Measured by Thermometer)	40 degC
c)	With 1.5 times rated voltage for 30 seconds	100C more than above value after continuous application of 1.1 times rated voltage.
d)	Maximum ambient temp. to be considered.	50 degC

It shall be suitable for mounting on steel structures and necessary fixing bolts and nuts shall be supplied with the equipment.

Its windings shall be housed either in a high impact resistance porcelain insulator where normal mineral transformer oil will be the insulating medium. Glazing of porcelain shall be of uniform brown or dark brown colour with a smooth surface arranged to shed away rain water particles (fog).

Details of attachment of metallic flanges to the porcelain shall be brought out in the offer.

Tank

The metal tanks shall have bare minimum number of welded joints so as to minimize possible locations of oil leakage. The metal tanks shall be made out of mild steel / stainless steel /aluminum alloy, depending on the requirement. Welding in horizontal plane is to be avoided as welding at this location may give way due to vibrations during transport resulting in oil leakage. Supplier has to obtain specific approval from Purchaser for any horizontal welding used in the bottom tank. Oil level gauge and convenient means of oil and nitrogen filling, sampling and draining of oil is to be provided in Tank.

Surface Finish

The ferrous parts exposed to atmosphere shall be hot dip galvanized or shall be coated with at least two coats of zinc rich epoxy painting. All nuts, bolts and washer shall be made out of stainless steel.

Insulating Oil

Insulation oil required for first filling of the instrument transformer shall be covered in supplier's scope of supply. The oil shall meet the requirement of latest edition IEC standard.

Prevention Of Oil Leakages And Entry Of Moisture:

The Supplier shall ensure that the sealing of instrument transformer is properly achieved. In this connection the arrangement provided by the Supplier at various locations including the following ones shall be described, supported by sectional drawings.

Locations of emergence of primary and secondary terminals.
Interface between porcelain housing and metal tanks.
Cover of the secondary terminal box.

Gasketed joints.

Wherever used nitrilc butyl rubber gaskets shall be used. The gasket shall be fitted in properly machined groove with adequate space for accommodating the gasket under compression.

Oil Level Indicators:

Instrument transformer shall be provided with oil sight window at suitable location so that the oil level is clearly visible with naked eye to an observer standing at ground level.

Earthing:

Metal tank of the instrument transformer shall be provided with two separate earthing terminals for bolted connection to 50x8mm MS Flat to be provided by the Purchaser for connection to station earth-mat.

Lift

Instrument transformer shall be provided with suitable lifting arrangement to lift the entire unit. The lifting arrangement shall be clearly shown in the general arrangement drawings. Lifting arrangement (Lifting eye) shall be positioned in such a way so as to avoid any damage to the porcelain housing or the tanks during lifting for installation transport. String guides shall be offered which shall be of removable type.

Core

The core shall be high grade non-aging, silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy at both normal and over voltages conforming to IEC. The characteristics shall be such as to provide satisfactory performance for burdens ranging from at least 25% to 100% of rated burden over a range of at least 5% to 110% rated voltage in case of protective cores and a voltage range of 80% to 120% (0.8 pf lagging).

BUSHING

Shaded dark chocolate porcelain substation class 3 bushing conforming to latest edition of IEC shall be used.. Cast metal end caps for the bushings shall be of high strength, & made of brass. They shall have smooth surface to prevent discharge taking place between the metal parts and porcelain as a result of ionisation. The insulation of bushing shall be co-ordinated with that of the potential transformer such that the flashover, if any will occur only external. Each of the bushing cap / head shall be complete with the following feature, Primary terminals suitable for connection through Rigid Connectors for ACSR Conductors. All connectors shall be provided as part of the tender.

TERMINAL CONNECTORS

All castings of connectors shall be free from holes, surface blisters, cracks and cavities. All sharp edges or corners shall be rounded off.

No part of the connectors shall be less than 10 mm. thick.

All ferrous parts shall be hot dip galvanised conforming to IEC and BS

Bimetallic strips and sleeves, if required, shall be provided of about 2 mm. thickness as a part of connector.

Rigid connectors shall be made from Aluminium Alloy.

All current carrying parts of the connectors shall have minimum contact resistance.

Connectors shall conform to type test as well as to routine test as per IEC

Connectors shall be suitable for connection with ACSR “Chafer” and “Lime” to CT terminal along with suitable nuts bolts & washers.

Bolts and nuts

All steel bolts and nuts shall conform to BS 4190 : 1957 the standard specified and the nuts and heads of all bolts to be hexagonal type. Nuts and bolts or screws used for fixation of the interfacing porcelain bushings for taking out terminal shall be provided on flanges cemented to the bushings and not on the porcelain. The Voltage Transformers shall be suitable for up right mounting on steel structures. Necessary flanges, bolts, clamps fittings etc. for base are within the scope of the supplier

Galvanizing

Except where specified to the contrary all iron and steel parts shall be galvanized after sawing, shearing, drilling punching, filing, bending, and machining etc., are completed. Galvanizing shall be by the hot-dip process to comply with the BS 729.

Creepage Distance

The Voltage Transformer insulator creepage distance shall not be less than 900 mm and the protected creepage distance shall not be less than 315mm.

PAINTING (wherever applicable)

The tank and top metallic parts shall be hot-dip galvanized/painted. All steel surfaces shall be cleaned by sand blasting or chemical process as required to produce a smooth surface, free of scale, grease and dirt.

Steel surface in contact with insulating oil shall be painted with heat resistant oil insoluble insulating varnish.

ADDITIONAL REQUIREMENTS

Terminal Markings

The Primary and Secondary winding terminals shall be marked clearly and indelibly on their surface or in their immediate vicinity conforming to IEC 186.

Rating Plate markings

Ratings and data of the Voltage Transformers shall be provided in the name plate which shall be weather and corrosion proof. The Name plate shall be securely attached to the side of the (lower part) Voltage Transformers so that it could be easily read from the ground level when it is installed at a height of 3m from the ground level.

It shall consist of the following information:-

1. Number and year of the standard adopted.
2. The manufacturer's identification
3. A serial number or type designation, preferably both.
4. The rated primary and secondary Voltage.
5. The rated frequency.
6. The rated output and the corresponding accuracy class.
7. The highest rated equipment voltage
8. The rated insulation level.
9. Rated voltage factor and the corresponding rated time.
10. Class of insulation.
11. The words "Property of FEA".

INFORMATION TO BE SUPPLIED WITH THE OFFER

The following shall be furnished with the offer.

1. Catalogues describing the equipment and indicating the model number.
2. Literature describing the operational features of the equipment.
3. Constructional features, materials used for components and relevant technical literature.
4. Complete dimensional drawings.
5. Magnetization and core loss curves
6. A list of names and addresses of ten recent purchasers (of similar items only) indicating quantities supplied, delivery time and the document from such purchasers certifying satisfactory performance of the equipment.
7. Rating plate details.
8. Completed Schedule of Particulars (ANNEXURE A).
9. Type Test Certificates - The Test Certificates and Performance Curves of the Type Test performed conforming to the IEC 186.
10. The test certificates shall clearly identify the equipment concerned, showing the manufacturer's identity, type No. and basic parameters, and shall be from a recognized independent testing authority acceptable to the purchaser.

Following Type Test reports shall also be submitted:

1. High-voltage, power-frequency wet withstand tests
2. Lightning impulse voltage withstand test (dry).
3. Temperature rise test.
4. Tests for determination of errors.
5. Short Circuit withstand capability test.

SPECIAL TEST FOR DRY TYPE AS PER RELEVANT STANDARD (following Tests Reports shall have to be submitted along with Bid documents, but may be relaxed in respect of date of Carrying out of such tests, at the discretion of Tendering authority.)

1. UV accelerated ageing test.
2. Water absorbtion test
3. Thermal shock test
4. Artificial pollution test

Each Type Test Report shall comply with the following information with Test results : i) Complete identification, date and serial no. ii) Method of application where applied, duration and interpretation of each Test.

Failure to furnish the particulars asked for in Clause 7.0 will result in the offer being rejected.

TECHNICAL LITERATURE AND DRAWINGS

Technical Literature in English language on the installation and operation shall be supplied with each set of equipment and they shall be descriptive and self explanatory, complete with necessary diagrams and drawings.

INSPECTION & TESTING

Factory Acceptance Test

The selected Bidder shall make necessary arrangements for inspection by two Engineer of the Fiji Electricity Authority to inspect the equipment and witness the routine test conforming to IEC 186.

ACCEPTANCE AND ROUTINE TESTS

All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the Supplier in presence of purchaser's representative unless dispensed with in writing by the Purchaser. The routine tests which shall be witnessed are given below:

(1) Immediately after finalization of the programme of routine / acceptance testing, the Supplier shall give sufficient advance intimation to the Purchaser to enable him to depute his representative for witnessing the testing.

1. Verification of terminal markings.
2. Power-frequency withstand tests on

3. Primary windings.
4. Secondary windings.
5. Between sections
6. Determination of errors.
7. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IEC. The entire cost of acceptance and routine tests that are to be carried out as per relevant IEC shall be treated as included in quoted price. Four copies of test reports duly signed by the inspecting officers shall be submitted.

DOCUMENTATION

All drawings shall conform to international standards 'A' series of drawings sheet. All drawings shall be supported with Auto CAD 2011 format. The dimensions and data shall be in S.I.Units.

List of Drawings:

1. General outline and assembly drawings of the equipment.
2. Graphs showing the performance of equipment in regard to magnetization characteristics.
3. Sectional view
4. General Constructional Features.
5. Materials/Gaskets/Sealing used.
6. The Insulation & the winding arrangements, method of connection of the primary / secondary terminals etc.
7. Porcelain used and its dimensions.
8. Arrangement of terminals and details of connection studs provided.
9. Name plate.
10. Schematic drawings.

Warranty Period:-

The supplier shall be responsible to replace, free of cost, with no transportation or insurance cost to the purchaser, up to destination, the whole or any part to the material which in normal and proper use proves the defective in quality or workmanship, subject to the condition that the defect is noticed within 18 months from the date of receipt of material in stores or 12 months from the date of commissioning whichever period may expire earlier. The replacement shall be effected by the supplier within a reasonable time, but not, in any case, exceeding 85 days. The supplier shall, also, arrange to remove the defective within a reasonable period, but not exceeding 45 days from the date of issue of notice in respect thereof, failing which, the purchaser reserve the right to dispose of defective material in any manner considered fit by purchaser, at the sole risk and cost of the supplier. Any sale proceeds of the defective material after meeting the expenses incurred on its custody, disposal handling etc., shall however be credited to the supplier's account and set off against any outstanding dues of the purchaser against the supplier. The warranty for 12/18 months shall be one time.

CONTRACT DRAWINGS AND MANUALS

The supplier shall submit to the purchaser the following tender purpose drawings and manuals along with tender documents. The drawings in line with tender specification shall also to be submitted after issuance of order in six (6) copies to the Purchaser for approval.

General outline dimension drawing furnishing front and side elevation, top and bottom plan, views showing all accessories, mounting arrangement on steel structures, spacing and size of the bolts, total creepage distance of bushing, electrical diagram for primary and secondary connections with polarity mark, terminal arrangement for secondary terminal box, size of primary terminals, grounding terminals and lifting lugs, quantity of insulating oil, net and shipping weight, shipping dimension etc.

INSTRUCTION MANUAL SHOULD CONTAIN :

i) A brief description furnishing the constructional features.
ii) Instruction for handling, storing, erection, commissioning and operation and maintenance.

iii) General outline drawing along with all components and accessories.
iv) Marked erection points identifying the component parts.
v) Detailed dimensions of assembly and description of all accessories.
vi) Detailed views of Core, winding assembly, winding connections and its tappings.
vii) List of spares and other necessary information
viii) A set of approved test certificate.

Documents to be submitted at the time of physical delivery at consignee stores: The following documents to be submitted by the vendors to the consignee, Stores at the time of despatch to stores by the vendors:-

SCHEDULE OF GURANTEES PARTICULARS

The Bidders are required to furnish the following Guaranteed Particulars for each type of Voltage Transformer offered.

No.	Description	Manufacturer Data
1	Manufacturer	
	Address, Telephone and fax	
	Place of tendered item	
2	Type	
3	Type of Mounting	
4	Rated Primary voltage	
5	Rated Secondary Voltage	
6	Rated frequency	
7	Volt factor and duration	
8	Transformation ratio	
9	Rated burden	
10	Rated insulation level	
	i) Dry Impulse withstand voltage(1.2kV/50ìs) Peak Positive Wave +kV Negative Wave -kV	
	ii) Power frequency withstand voltage kV	
11	Creepage distance of the insulator	
12	Temperature Rise	
	With 1.2 times rated primary continuously	
	By resistance method	
	By thermocouple / thermometer	
13	Rated Insulation Level	
	1.2/50 micro sec. Impulse withstand voltage on primary side	
	1 min power frequency withstand voltage(dry)on primary side	
	1 min power frequency withstand voltage(wet)on primary side.	
	1 min power frequency withstand test voltage on secondary side.	
14	Whether VT is hermetically sealed or not	
15	Name of Dry Inert Gas	
16	Pressure of Inert Gas	
17	Ratio & Phase angle error.	
18	Protected creepage distance	
19	Accuracy class	
20	Rated accuracy limit factor	
21	Voltage Ratio	
22	Voltage factor and rated time	
23	Service conditions Such as indoor or outdoor temperature conditions, altitude, humidity, suitability for exposure to steam, vapour, fumes, explosive gases, excessive dust, salt air etc. should be stated. -	
24	Type of secondary	
25	Volume of oil	
26	Measurement	
27	Total Weight	
28	no. of phases	
29	For non-composite capacitor voltage transformers	
	(i) In a tapped bushing, the nominal capacitance & -	

	p.f. values of C1 and C2 and the tolerance limit (ii) The maximum permissible working voltage on C1 kV	
30	Connection drawings	
31	Steel structure	
32	Bolts and nuts	
33	Test certificates	
34	Drawings	
35	FAT	
36	Connectors	

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 **4:00pm, on Wednesday 19th July, 2017.**

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

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

In additional, hard copies of the tender, one original and one copy must be deposited in the tender box located at the FEA Head Office, 2 Marlow Street, Suva, Fiji no later than **4:00pm, on Wednesday 19th July, 2017 -** Addressed as

Tender – MR 130/2017 – Design, Supply & Installation of Outdoor Steel structures and 33kV Electrical Accessories for Voivoi Substation Project, Nadi

The Secretary Tender Committee
Fiji Electricity Authority
Head Office
Suva
Fiji

- **Hard copies of the Tender bid will also 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 4:00pm **on** the closing date of **Wednesday 19th July, 2017** 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.**