



MR 43/2017

**SUPPLY OF
NEUTRAL EARTHING RESISTOR COMPLETE WITH
MOTORISED ISOLATORS FOR NEW KINOYA POWER
STATION AND ROKOBILI POWER STATION**

FIJI ELECTRICITY AUTHORITY

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REVISION HISTORY & DOCUMENT CONTROL

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1 INTRODCUTION AND SCOPE OF WORK

Fiji Electricity Authority ("FEA") is responsible for generation, transmission and distribution of electricity in Viti Levu, Vanua Levu, Ovalau and Tavueni in Fiji. By the end of 2016, the FEA had 174,530 customers. This included residential, commercial and institutional customers.

FEA is seeking tender bids from reputable manufacturers and suppliers for design, manufacture, testing and supply of neutral earthing resistors for its New Kinoya and Rokobili power stations.

This tender specification outlines the instruction to bidders, design and performance criteria for the neutral earthing NERs and associated equipment to be supplied with the neutral earthing resistors.

2 INSTRUCTIONS TO BIDDERS

2.1 Eligible Bidders

This invitation is open to all Bidders who have sound Financial Background, and have previous experience in design, manufacture and supply of such NERs.

Bidders shall provide such evidence of their continued eligibility satisfactory to FEA as FEA shall reasonably request. Bidders who are not manufacturer of such NERs shall provide evidence of agency.

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

2.2 Eligible Materials, Equipment and Services

The materials, equipment, and services to be supplied under the Contract shall have their origin from reputable companies as specified by FEA and from various countries and all expenditures made under the Contract will be limited to such materials, equipment, and services. Upon request, bidders may be required to provide evidence of the origin of materials, equipment, and services.

For purposes of this Contract, "services" means the works and all project-related services including design services.

For purposes of this Contract, "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.

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.

2.3 One Bid Per Bidder

Each bidder shall submit only one bid. A bidder who submits or participates in more than one bid will cause all those bids to be rejected.

2.4 Cost of Bidding

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

2.5 Site Visits

No site visits are required for this project. Bidders can contact the FEA Supply Chain Office if they require to visit the site.

2.6 Contents of Bidding Documents

The bidder is expected to examine carefully the contents of this Bidding document. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

2.7 Clarification of Bidding Documents

A prospective bidder requiring any clarification of the bidding documents may notify FEA in writing by fax (hereinafter the term "fax" is deemed to include electronic transmission such as facsimile, cable and telex), or email addressed to:

Tuvitu Delairewa
General Manager Corporate Services
2 Marlow Street, Suva, FIJI.
Phone: 679 3224 185
Facsimile: 679 331 1882
Email: TuvituD@fea.com.fj

FEA will respond to any request for clarification which it receives earlier than 10 days prior to the deadline for submission of bids.

2.8 Amendment of Bidding Document

At any time prior to the deadline for submission of bids, FEA 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.

2.9 Language of Bid

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

2.10 Bid Prices

Unless specified otherwise, Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Supplier'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), testing and delivery.

Bidders shall give a breakdown of the prices in the manner and detail called for in this bidding document, or any issued addenda.

Bids shall be given on DDU basis. The point of delivery shall be FEA's Navutu Depot in Lautoka. The term DDU shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, Paris.

2.11 Bid Currencies

Prices shall be quoted in a single currency only.

2.12 Bid Validity

Bids shall remain valid for a period of **90 days** from the date of Deadline for Submission of Bids specified in Sub-Clause 2.15.

2.13 Format and Signing of Bids

The bidder shall prepare one original and two (2) copies of the technical and financial proposals, clearly marking each one as: "ORIGINAL-TECHNICAL & PRICE PROPOSAL", "COPY NO. 1 - TECHNICAL & PRICE PROPOSAL", etc. as appropriate. In the event of discrepancy between the original and any copy, the original shall prevail.

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. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.

The bidder shall provide one electronic copy of the Technical and Financial proposals on FEA's electronic tender hosting website, <https://www.tenderlink.com/fea>.

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

2.14 Sealing and Marking of Bids

The bidder shall seal the original copy of the technical proposal and 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-TECHNICAL & PRICE PROPOSAL", "COPY NO. 1 - TECHNICAL & PRICE 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", "COPY No. 1", etc.

The inner and outer envelopes shall

- a) be addressed to FEA 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

- b) bear the following identification:

- Bid for: SUPPLY OF NEUTRAL EARTHING RESISTOR COMPLETE WITH MOTORISED ISOLATORS FOR NEW KINOYA POWER STATION AND ROKOBILI POWER STATION
- Bid Tender Number: MR43/2017
- DO NOT OPEN BEFORE: 1600hrs on 5th April 2017

In addition to the identification required, 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 Deadline for Submission of Bids.

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

2.15 Deadline for Submission of Bids

Bids must be received by FEA at the address specified above no later than 1600 hours (Fiji Time) 5th April 2017.

In addition to this, Bidders are required to upload an electronic copy of their tender bids to the FEA's electronic tender hosting website, <https://www.tenderlink.com/fea>. Hard copies of the tender bids 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.

FEA may, at its discretion, extend the deadline for submission of bids by issuing an addendum, in which case all rights and obligations of FEA and the bidders previously subject to the original deadline will thereafter be subject to the deadlines extended.

2.16 Late Bids

Any bid received by FEA after the deadline for submission of bids prescribed above will be rejected and returned unopened to the bidder.

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.

2.17 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 FEA 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 Sealing and Marking of Bids, 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.

2.18 Rejection of One or All Bids

FEA 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 rejection.

2.19 Process to be Confidential

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 FEA's processing of bids or award decisions may result in the rejection of the bidder's bid.

2.20 Clarification of Bids

To assist in the examination, evaluation and comparison of bids, FEA may, at its discretion, ask any bidder for clarification of its bid. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by FEA in the evaluation of the bids.

3 GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract shall be based upon AS 4911 – 2003 General conditions of contract for the supply of equipment without installation.

The Conditions of Contract comprises two parts:

1. Part 1 – General Conditions; and
2. Part 2 – Conditions of Particular Application

4 CONDITIONS OF PARTICULAR APPLICATION

Not applicable.

5 REFERENCES

5.1 Applicable Standards

Neutral Earthing Resistor (NER) shall be designed, manufactured and tested in accordance with the following International Standards and all amendments issued prior to the date of closing of tenders except where varied by this Specifications.

IEEE Std. 32 Requirements, terminology & Test Procedures for Neutral Grounding Devices
IEC 60529 Degrees of protection provided by enclosures (IP Code)

Should inconsistencies be defined between Standards and this Specifications, this Specification will take precedence. However, significant inconsistencies shall be referred to FEA for resolution.

5.2 Applicable Laws

The Supplier warrants (without limiting any other warranties or conditions implied by law) that all Goods have been produced, sold and delivered to FEA in compliance with all applicable laws (including all workplace health and safety and electrical safety legislations and codes of conduct).

6 SERVICE CONDITIONS

6.1 Environmental Conditions and Mounting

The neutral earthing resistor shall be suitable for mounting outdoors on structures provided by the Supplier and on concrete footings provided by FEA. It shall be designed to withstand the following service conditions.

Height above sea level	:	not exceeding 1000 m
Atmosphere	:	Saliferous, corrosive and dusty
Ambient temperature	:	Peak : 40°C
	:	24 Hour Average: 30°C
	:	Annual Average: 22°C
	:	Minimum: 10°C
Relative Humidity (Average)	:	85%
Rainfall	:	Annual Average: 1900 mm
Wind Speed	:	Sustained : 55 m/s
	:	Gusts : 70 – 110 m/s
Isokeraunic Level	:	60 Thunder days per year
Seismic	:	To a maximum of 7 on the open-ended Richter Scale

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.

6.2 System Conditions

The rated frequency of FEA's power system is 50 Hz. Each unit shall be suitable for use on its respective system position.

Highest (Equivalent) System Voltage:	36kV
Nominal system voltage:	33kV

6.3 Minimum Technical Requirements

	New Kinoya	Rokobili
Supply Voltage	36kV	36kV
Phase Voltage	21kV	21kV

Current rating	240 A	65 A
Resistance at 20° C	80 ohms	320 ohms
Tolerance	± 10%	± 10%
Maximum temperature rise	760 deg C	760 deg C
Rating (Time)	10s	10s
Power frequency withstand voltage Test to earth	70kV	70kV
Rated BIL	170kV	170kV
Method of Cooling	Natural	Natural
Degree of Protection	IP 54	IP 54
Number of motorized off-load isolators	Four (4)	Eight (8)

7 DESIGN AND MANUFACTURING CRITERIA

The NER shall comply with IEEE standard 32- 1972. NER shall be of the dry, outdoor and metal grid type. They shall be manufactured of edge wise wound, stainless steel strip or other approved metal or alloy not prone to embrittlement or corrosion and shall be suitable for outdoor service on 33kV system. Liquid resistors are not accepted.

Each resistor shall consist of a number of element assemblies electrically grouped so as to form parallel paths without cross connections to ensure that the time rating is not reduced if one of the paths become open circuit.

Cross-connections between paths shall not be made, so that the overall resistor does not have its time rating reduced in the event of a resistor element assembly becoming open circuit.

The tolerance of each resistance and the temperature coefficient of resistance shall be such that at the maximum temperature rise of the elements, after the application of rated voltage for 10 seconds, the total resistance variation shall be no greater than 10% of the nominal value.

Suppliers shall state the minimum time which must elapse, after application of rated voltage for 10 seconds, before re-application of rated voltage for 10 seconds. Where installed outdoors, the resistor enclosures shall be clad from GR316L Stainless Steel.

The enclosure shall be fabricated with louvers in the vertical surfaces if required, and the whole enclosure shall be weather proof and vermin proof. Adequate insulating barriers shall be provided to prevent internal flashover.

Doors, fitted with restraining devices when open, shall be fitted to the enclosures to provide access to the resistor elements and rite cable termination area. The doors shall be capable of being locked closed with a Lockwood type 234B padlock, 45mm wide and 19mm opening,

Fittings for hinged doors shall be suitable for outdoor use and fully corrosion resistant.

Hinges shall be stainless steel, door catches shall be manufactured of stainless steel or non-ferrous metal.

To allow measurement of the resistor fault current, the ground end of the resistor shall be brought out from the enclosure via an insulating bushing of appropriate current rating. The bushing external palm shall be vertical at a height 600mm from the enclosure floor and drilled to allow the connection of a 40mm x 4mm copper earth bar with 2 off 12mm galvanized steel bolts at 40mm center distances.

An internal earth bar of cross sectional dimensions not less than 40 mm x 4mm shall be provided. All accessible metal parts containing or supporting high voltage conductors and all parts which are designed to function at earth potential shall be jointed or bonded so that they are effectively connected to the main earth bar. Hinged doors shall be bonded to the main cubicle by flexible copper braid of at least 40 sq. mm cross - section. Items of auxiliary equipment such as switches, relays, motors and heaters shall, unless connected by effective continuous metal panels, be bonded to the main cubicle earth by means of a stranded conductor of at least 4.5 sq. mm. Adequate insulating barriers shall be provided to prevent internal flashover.

The main cubicle earth bar shall be connected to the station earth grid bar with 2 off 12mm galvanized steel bolts at 40mm centers, via holes drilled into one of the base channels.

The resistors shall be complete with lifting and jacking lugs, access holes, earth terminals, connections and bushings suitable for the system phase to neutral voltage.

The specified resistance is to be that at the design ambient temperature and it shall be capable of passing the specified current for 10 sec with a maximum temperature rise as specified.

A rating plate shall be affixed on the NER with the following information

- Name of the manufacturer
- Place and year of manufacture
- Standards to which the NER complies to
- Manufacturer's serial number
- Resistance value at 20deg C and tolerance
- Enclosure IP rating
- Rated voltage

The rating plate shall be stainless steel to grade 316, and shall be securely fitted at eye level.

FEA also requires single phase motorized isolators to be installed with the neutral earthing resistors. The Bidder shall provide recommendations if single phase motorized isolators can be provided with the neutral earthing resistor in the quantities given in Section 6.3. Preference will be given to a packaged solution of neutral earthing resistor and motorized isolators.

8 INSPECTION AND TESTING

The supplier shall be responsible for carrying out tests to demonstrate the equipment and its components supplied, complies with the technical requirements in this specification.

The type, special and routine tests shall be carried out on the equipment and its components in accordance with this specification, prior to approval being granted for use by FEA.

All type tests shall be carried out by a testing authority holding accreditation.

All type test reports shall be accompanied by copies of the accreditation certificate(s) issued to the testing laboratory. The accreditation certificate(s) shall be valid for the relevant test(s) and for the duration of the test(s).

8.1 Routine Tests

The following routine test shall be carried out for each Neutral Earthing Resistor.

- i. Measurement of resistance at 20° C
- ii. Insulation Test
- iii. Applied high potential test at 70kV for 1 minute

8.2 Witnessing of Tests

The Supplier shall make allowance for one FEA Engineer to witness the routine tests which shall be requested to be performed. All costs for the witnessing of such type tests shall be borne by the Supplier.

Where applicable, the Supplier shall give FEA not less than four (4) weeks' notice of when each and every type test will be carried out.

9 RELIABILITY

9.1 Service Life

Suppliers are required to comment on the reliability of the equipment and the performance of the materials offered for a service life of 45 years under the specified system and environmental conditions.

9.2 Evidence in Support of Reliability

Such comments will include evidence in support of the reliability and performance claimed including information on Failure Mode and Effect Analysis.

10 ENVIRONMENTAL CONSIDERATIONS

Suppliers are required to comment on the environmental soundness of the design and material used in the manufacture of the items offered. In particular, comments should address such issues as recyclability and disposal at end of service life.

11 PACKAGING AND MARKING

The packaging of items by the Supplier must ensure that they are capable of being delivered undamaged giving due consideration to the quantity, distance of transportation and the preferred method of handling at each location.

The Supplier shall take all necessary precautions to ensure safe handling of the NER and associated accessories.

12 QUALITY REQUIREMENTS

Suppliers are required to submit evidence that the design, manufacture and testing of the NER are in accordance within a quality framework.

13 PRODUCT WARRANTY PERIOD

The Supplier is required to provide the warranty period as part of the proposal. A minimum warranty period of twenty-four (24) months from time of dispatch from factory shall be provided.

14 INFORMATION TO BE SUPPLIED BY THE SUPPLIER

14.1 Documentation to be supplied with the tender

To enable FEA to fully evaluate NER offered, the Supplier will submit the following information with their tender:

- List showing similar equipment supplied to or on order for other utilities
- Catalogues describing the equipment and including the model number
- Constructional feature material used for components and relevant technical literature
- Installation, commissioning, operation and maintenance instructions
- Overall dimensional drawing
- Complete Guaranteed Technical Particulars (Appendix A).
- Performance certificate with regard to manufacture, supply and utilization of the earthing resistor of similar type
- Detailed foundation drawing
- Following Type test certificate
 - Resistance at 20° C
 - Insulation Test
 - Duty test
- Evidence of quality management systems

Suppliers may be asked to provide additional information during tender assessment period or following award of contract.

APPENDIX A: SPECIFICATION REQUIREMENT

	Item	Units	Required	Tendered
1.	Name of Manufacturer			
2.	Manufacturer's Address			
3.	Country of Origin			
4.	Typed/Model No.			
5.	Current ratings	Amps		
6.	Resistance at 20° C	Ohms		
7.	Resistance after carrying the rated current for rated time	Ohms		
8.	Temperature rise after carrying rated current for rated time	° C		
9.	Maximum permissible temperature of			
	Resistor	° C		
	Insulator	° C		
	Enclosure	° C		
10.	Dimensions			
	Length	mm		
	Width	mm		
	Height (including bushing & support structure)	mm		
11.	Material of			
	Resistor			
	Supporting insulator			
	Enclosure			
12.	Type of Insulator			
13.	Rated Voltage	kV	36kV	
14.	Power frequency withstand voltage	kV		
15.	Minimum dry flash over voltage	kV		
16.	Minimum wet flash over voltage	kV		
17.	Impulse withstand voltage against casting	kV Peak		
18.	Impulse withstand voltage against ground	kV Peak		
19.	Gross Weight	kg		

APPENDIX B: DEPARTURE FROM SPECIFICATIONS

The Supplier shall nominate the Clause or relevant section of the tender specification and describe the departure.

Tender Specification Reference ⁱ	Departure

ⁱ Where possible, the Tender shall refer to the specific clause of the tender specification.