



## **ENERGY FIJI LIMITED**

**PREFERRED SUPPLIER FOR DESIGN,  
MANUFACTURE, TEST AND SUPPLY OF  
33kV PORCELAIN PIN INSULATORS AND  
SPINDLES**

**MR 65/2025**

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# 1.0 Introduction

Energy Fiji Limited [EFL] is responsible for Generation, Transmission and Distribution of Electricity in Viti Levu, Vanua Levu, Ovalau and Taveuni in Fiji. By the end of 2023, EFL had 219,853 customers. This includes residential, commercial and institutional customers.

The Energy Fiji Limited (EFL) is requesting proposal for the Design, Manufacture, Testing and Supply of 33kV Line hardware items listed below for EFL’s consumption to carryout repair, maintenance and Construction of Power line Network in Fiji.

The preferred supplier arrangement will be for a period of 3 (three) years from the date of signing of the contract. The award of this Tender may be split and awarded to more than one successful bidder. This document outlines the technical requirements for 33kV insulators and line hardware’s for use in EFL’s transmission network.

The items covered under this specification are tabulated below.

No.	Stock Code	Item Description
1	I04927C	33kV PORCELAIN Pin Insulator
2	I04997	33kV Spindle for Pin Insulator

This Specification covers the general requirements of design, manufacture, testing, supply and delivery of Insulators complete with hardware for 33kV overhead transmission systems.

## 2.0 References

### 2.1 Applicable Standards

The item shall be designed, manufactured and tested in accordance with the latest edition of the Standards specified below and all amendments issued prior to the date of closing of tenders except where varied by this specification.

AS 1112	ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts
AS 1154 (All Parts)	Insulator and conductor fittings for overhead power lines
AS 1214	Hot-dip galvanized coatings on threaded fasteners
AS 2700	Colour standards for general purposes
AS 1237	Plain washers for metric bolts, screws and nuts for general purposes General plan
AS 2947.1	Insulators - Porcelain and glass for overhead power lines - Voltages greater than 1000 V a.c. - Test methods
AS 3609	Insulators Porcelain stay type - Voltages exceeding 1000 V a.c.
IEC 61284	Overhead lines - Requirements and tests for fittings.
IEC 61109	Insulators for Overhead Lines - Composite Suspension and Tension Insulators for A.C. Systems with a Nominal Voltage Greater than 1000 V - Definitions, Test Methods and Acceptance Criteria
IEC 62217	Porcelain HV Insulators For Indoor and Outdoor Use - General Definitions, Test Methods and Acceptance Criteria
AS62217	Porcelain insulators for indoor and outdoor use with a nominal voltage > 1000 V - General definitions, test methods and acceptance criteria
IEC 62073	Guidance on the Measurement of Hydrophobicity of Insulator Surfaces
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
AS/NZS ISO 9001	Quality management systems -Requirements
AS1650	All ferrous parts Hot did Galvanized
IEC 60672-3	Ceramic and glass-insulating materials

Should inconsistencies be identified between standards and/or this specification, the tenderer shall immediately refer such inconsistencies to EFL for resolution.

## 3.0 System Conditions

### 3.1 Environmental Conditions

The insulators shall be suitable for installation outdoors and shall be designed to withstand the following service conditions.

Description		Conditions
Atmosphere Pollution Level	:	Very heavy (IEC 60815)
Ambient Temperature	:	Peak: 40°C 24 Hour Average: 30°C Annual Average: 22°C Minimum: 10°C
Relative Humidity (Average)	:	85%
Rainfall	:	Annual Average: 2663mm
Isokeraunic (Thunder day) 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. Equipment may be installed in coastal environments and in conditions where special protection measures against corrosion will be required. Bidders are required to provide details of such protective measures for protection against corrosion.

### 3.2 Electrical Properties

Nominal Voltage	33kV
System Highest Voltage	36kV
System Frequency	50Hz
Number of Phases	3
Rated Continuous Current (Amps)	400 Amps
System Earthing	Solidly Earthed, Low-impedance earthed
Impulse Withstand Voltage (peak)	200kV
Power Frequency Withstand Voltage	70kV (peak)
Short Circuit Level	16kA for 1 Sec
Wet p.f. withstand voltage	85kV
Dry p.f. withstand voltage	115kV

### 3.3 Physical Properties

Nominal Creepage Distance	915mm
Protected creepage distance	360mm
Dry Arcing Distance	360mm
Specific Creepage Distance	25.4mm/kV
Pollution Level	Heavy
Net weight	14kg
Colour	Light Grey

### 3.4 Mechanical Properties

Cantilever Failing Load	18kN
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### 3.5 Dimensions and Accessories

Total Width of Insulator	190mm
Length of Insulator (Porcelain)	377mm
Length of the Spindle	255mm
Total length of the Insulator	632mm
Stud Size	M20
Square washer	60x60x6x22mm hole
Spring Washer	20mm Diameter Double Helix Spring washer
Nut	M20 hexagonal nut
Lock nut	M20 hexagonal lock nut

## 4.0 Design and Construction

Equipment offered by the bidders will need to conform to this Specification.

### 4.1 General

The Energy Fiji Limited, in its transmission network employs Porcelain Pins and Strain insulators for 33kV voltage levels. The stay insulators employed in the transmission network are of Porcelain type.

33kV Pin Insulator	Porcelain
33kV Spindle for Pin Insulator	Hot Dip Galvanized

### 4.2 PIN Insulators

The Pin insulators will be used on lines on which conductors will be of type AAC and ACSR. The

insulators should withstand the conductor tension, the reversible wind load as well as the high frequency vibration due to wind.

Pin insulators shall be made suitable for mounting in the vertical plane. The insulators shall be of the top groove tie type and shall be mounted rigidly on a supporting structure by means of a pin passing up inside the insulator. The insulator offered shall comply with AS 61109 standard. The minimum creepage distance is 34mm/kV that's approx. 1200mm for 33kV Pin Insulators.

The design of the Porcelain insulators shall allow for easy inspection, cleaning and hot line maintenance.

The Porcelain shall not engage directly with the hard metal and all corresponding parts to be made to gauge and be interchangeable.

Leaking Pin insulators has been one of the major cause of outages for the transmission network, therefore bidder is requested to submit testing reports from a certified NATA accredited laboratory or equivalent.



### **4.3 33kV Spindle (Insulator Steel Pins)**

The spindles are to be designed and manufactured in accordance with AS1154.2. Vendors are to submit a drawing with specification of the spindles. The Pins must cater for the cross-arm thickness of 100 mm and depth of 150 mm and shall be mountable on strain plate using double nuts. The Pin insulators shall be supplied complete with hot dip galvanized steel pin, nut and washers of suitable size in accordance with AS 1214 and/or AS/NZS 4680.. The bidder is requested to provide details reports of any failure of pin supplied previously to other utilities and what action was taken to mitigate future failures.

### **4.4 Note to bidders**

Bidders are required to provide EFL with the following options:

1. The 33kV pin insulator (EFL stock code: I04927C) bottom thread shall be offered in both Nylon Alloy and Cast Lead.
2. The spindle for 33kV pin insulator (EFL stock code: I04997) thread shall be offered in both Nylon Alloy and Cast Lead.
3. EFL will select the product observing the provided samples.
4. Bidders are required to provide complete dimensional drawings for Nylon Alloy thread and Cast Lead threads offered for 33kV pin insulators and spindles.
5. Bidders to provide AutoCAD and PDF copies of the 33kV Pin Insulator
6. Insulator drawings with dimensions. Scanned copies of the drawings will not be accepted.

## **5.0 Quality Assurance**

The manufacture shall submit evidence that the design and manufacture of Non-tension Bolted Connectors are in accordance with AS/NZS ISO 9001 and shall include the Capability Statement associated with the Quality System Certification.

If the Tenderer is a non-manufacturing supplier, the documentary evidence shall include the quality system certifications of both the supplier and the manufacturer.

## **6.0 Occupational Health & Safety Requirements**

Tenderers are required to submit copies of certification to occupational health and safety management system, such as AS4801 or to equivalent international standard ISO 45001. Such information is deemed mandatory bid submission and lack of it will result in disqualification of bid.

Bidders are also required to submit evidence of certification to ISO 14001.

In addition to this, Bidders also need to submit health and safety plans implemented in factories for design, manufacture and testing of the 33kV insulators, which will be used in this project, and details of agencies who carry out regular inspections at these factories.

## 7.0 Performance and Testing

### 7.1 General

Prior to delivery, the units shall have completed the type, routine and accuracy tests and inspections from a NATA Certified Lab as required by the relevant international and Australian standards. The passing of such tests shall not prejudice the right of EFL to reject the equipment if it does not comply with the specification when received or installed.

All testing shall be undertaken by an AS ISO/IEC 17025 accredited test house. The bidder shall submit evidence showing IEC 17025 compliance. A formal report covering the outcome of the different tests shall be made available to EFL.

### 7.2 Type Test

The following are minimum AS and IEC Standards requirements provided for testing of specific insulators and spindle and all test reports shall be provided with the bids for verification by EFL.

Mandatory Requirement: The test results shall be from a NATA certified test laboratory (or equivalent accreditation). The bidder shall submit a copy of the NATA (or equivalent accredited) certification of the test laboratory.

No.	Stock Code	Item Description	Testing Reference
1	I04927C	33kV Porcelain Pin Insulator	The following tests shall be conducted in accordance with IEC 61109, Clause 10, sub-clause 10.1, Table 2:
2	I04997	33kV Spindle for Pin Insulator	<ol style="list-style-type: none"> <li>1. Tests on interfaces and connections of end fitting:               <ol style="list-style-type: none"> <li>a) Pre-stressing</li> <li>b) Water immersion pre-stressing</li> <li>c) Verification tests</li> <li>d) Visual examination</li> <li>e) Steep-front impulse voltage test</li> <li>f) Dry power-frequency voltage test</li> </ol> </li> <li>2. Tests on shed and housing materials:               <ol style="list-style-type: none"> <li>a) Hardness test</li> <li>b) Accelerated weathering test</li> <li>c) Tracking and erosion test</li> <li>d) Flammability test</li> </ol> </li> <li>3. Tests on the core material:               <ol style="list-style-type: none"> <li>a) Dye penetration test</li> <li>b) Water diffusion test</li> </ol> </li> <li>4. Assembled core load-time test:               <ol style="list-style-type: none"> <li>a) Determination of the average failing load of the core of the assembled insulator</li> <li>b) Control of the slope of the strength-time curve of the insulator</li> </ol> </li> </ol> <p>In addition to the above, the following type tests shall also be conducted to relevant international standards:</p> <ol style="list-style-type: none"> <li>1. Dry lightning impulse withstand voltage test</li> <li>2. Wet power-frequency (50Hz) withstand voltage test</li> <li>3. Mechanical load-time test and test of the tightness of the interface between end fittings and insulator housing</li> <li>4. Galvanizing tests</li> </ol>

### **7.3 Routine Tests**

Routine tests are intended to eliminate defective units and shall be carried out during the manufacture of the insulators. Porcelain Pin insulators shall be routine tested in accordance with AS 62217/IEC 61109.

The vendors shall supply duly certified copies of the routine test performed on the insulators.

### **7.4 Witnessing of Tests**

The Bidder shall make allowance for two EFL's Engineers to witness the type tests. All costs for the witnessing of such type tests shall be borne by the Bidder.

The Bidder shall also make allowance for witnessing of routine tests by two EFL Engineers.

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

### **7.5 Certificate of Compliance**

The Supplier shall state in writing that their offer complies with the relevant Standards and this specification. If the Supplier is offering equipment manufactured to an equivalent standard, full details of that standard must be given including a copy written in English.

## **8.0 Additional Requirements**

### **8.1 Packaging and Marking**

The supplied items shall be appropriate packaged to avoid damage during transportations and storage and fit for use. Pre-greased items shall be individually packed in sealed plastic bags. The vendor shall be responsible for nominating standard pack quantities and standard packs shall be clearly marked with the following:

1. Manufacturer's name
2. Purchase Order Number, Contract Number and EFL Stock Number
3. Compliance standards
4. Item description
5. Package weight

### **8.2 Storage**

The equipment shall be capable of being stored without deterioration within the temperature range of 10°C to 40°C for no less than 24 months.

## **9.0 Technical Information to be supplied**

To enable the EFL to fully evaluate the 33kV insulators offered, (in addition to the completed Specification Requirement and Guaranteed Performance schedule) the bidder shall submit the following information with their tender: (Note these are mandatory requirements)

- Sectional view, showing the General constructional feature
- Complete dimensional drawing in PDF copies and AutoCAD
- List showing similar product supplied to or on order for other utilities in Australia or New Zealand or the Oceania region for the past 5 years

- Type test certificates
- Sample routine test certificates
- End of service life disposal methods
- Product drawing/datasheet and catalogues
- Evidence of Quality Management Systems used in the manufacturing process
- Evidence of Health, Safety and Environmental plans
- Evidence of financial ability to provide the level of service and support
- Origin of materials used in manufacture of the fuse links

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

**Offers of bidders who fail to furnish above particulars shall be rejected.**

## 10.0 Stock Availability

The bidder is required to show the size of his/her stock holding and the ability to meet the required estimate quantity per annum. The movement of the insulators will depend on EFL's project works and for operation and maintenance purposes. An estimate movement of the item are outlined in the table below but it will not be purchase as a lump sum quantity at once. Hence, the successful bidder will be required to carry a consignment / safety stock at times to meet EFL's demand within the three year contract period.

No.	Stock Code	Item Description	Approximate 3 Year Stock Movement
1	I04927C	33kV Porcelain Pin Insulators	600
2	I04997	33kV Spindle	600

## 11.0 Product Warranty Period

The bidder 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.

## 12.0 Environmental Considerations

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

## 13.0 Reliability

Suppliers are required to submit a list of electricity utilities that use the product, together with names and contacts of technical personnel from the subject utilities who can be contacted to provide technical reference check for the product and customer satisfaction. Suppliers are also required to comment on the reliability of the equipment and the performance of the materials tendered for a service life of 35 years under the specified system and environmental conditions.

## **14.0 Samples**

### **14.1 Production Samples**

Samples of items may be required during the tender assessment period. Samples would normally be required from tenderers who have previously not supplied the items to EFL.

### **14.2 Sample Delivery**

When samples are required, production samples shall be delivered freight free (Delivery Duty Paid (DDP)), suitably packaged and labelled including reference to the Tender Number.

Samples shall be supplied within 7 days of official request.

## **15.0 Training**

Training material in the form of drawings, instructions and/or audio visuals shall be provided for the items accepted under the offer.

This material shall include but is not limited to the following topics:

- Handling
- Storage
- Application
- Installation
- Maintenance
- Environmental performance
- Technical Specifications and Compliance
- Electrical performance
- Mechanical performance
- Disposal

## 16.0 Appendix

### 16.1 Price Schedule

All tenderers are required to complete and submit a copy of the price schedule with their bid submissions.

No.	Stock Code	Item Description	Quantity Required	Unit Price (CIF)	Total Price
1	I04927C	33kV Porcelain Pin Insulators	1000		
2	I04997	33kV Spindle	1000		
3	FAT of 2 x EFL Engineers				

Bidders are to Clearly indicate the Currency of Bid

### 16.2 Technical Details

The schedule shall be completed and submitted with the offer. Note the following instructions while completing the schedules:

- a) The schedule is provided as a separate attachment;
- b) The bidders are required to complete the schedule in excel format and submit with the bid;
- c) All data provided in the schedule shall be reflected in the original datasheets provided;
- d) The units specified in the schedule shall be strictly followed;
- e) The price schedule as per clause 16.1 is also attached in the excel sheet for completion.

(Note these are mandatory requirement)

## Submission Requirements

All tenderers are required to complete and submit a copy of the submission requirements with their bid submissions.

Requirements	Response from Bidders
Completed Price schedule	
Completed technical specification details	
Price included for Witnessing of Type Tests as part of bid. (Yes/No)	
Validity of bid (120 days required) (Yes/No)	
Payment conditions.	
Delivery Term. (CIF preferred)	
Price review period after award of tender. (months)	
Bidders company profile outlining financial, technical and production capabilities.	
Detailed reference list of customers already using equipment offered during the last 5 years with particular emphasis on units of similar design and rating.	
Quality management system used in the production of connectors, attached certificate.	
Health, Safety and Environmental plans.	
Detailed receiving, handling and storage details.	
Minimum warranty period from time of acceptance of item.	
Typical installation manual	
Disposal method after service life.	
Complete dimensional drawing (AutoCAD Drawing)	
List of Type test certificates provided. (As per Clause 7.1)	
Sample routine test certificates.	

Name of Tenderer: \_\_\_\_\_

Signature of Tenderer: \_\_\_\_\_

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

## **Tender Submission - Instruction to Bidders**

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

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

**This tender closes at 4.00pm (1600hrs) on Wednesday 12<sup>th</sup> February 2025.**

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

**The bidders must ensure that their bid is inclusive of all Taxes payable under Fiji Income Tax Act.**

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

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

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

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