



MR 69/2018

PREFERRED SUPPLIER

FOR

**DESIGN, MANUFACTURE, TESTING AND SUPPLY OF
CABLE ACCESSORIES, OUTDOOR TERMINATION AND
JOINTING MATERIAL FOR 33kV POWER CABLES.**

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1 Purpose and Scope

Fiji Electricity Authority [FEA] is a sole utility business unit in Fiji responsible for the power production, transmission, distribution and retailing to its valued customers around the nation.

This specification sets out the requirements for the manufacture, testing, supply and delivery of 33kV cable accessories, terminating kits and jointing materials for the use in the underground electricity distribution system of Fiji Electricity Authority.

This specification includes heat shrink, cold shrink and cold applied joints and outdoor terminations for 33kV cable. There are two sizes 33kV power cable (Aluminium) used by FEA which is 300 mm² and 600 mm². Suppliers are encouraged to submit alternative tenders based on their standard products provided that the accessories offered will provide electrical and mechanical in-service performance equivalent to the accessories conforming to this specification. Type test Certificates or Qualification Test Reports shall be submitted to verify performance. Departures from this specification shall be fully documented in the tender.

2 Instruction 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 jointing and outdoor termination kits.

Bidders shall provide such evidence of their continued eligibility satisfactory to FEA as FEA shall reasonably request. Bidders who are not manufacturer of such jointing and outdoor termination kits 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 tender.

2.6 Contents of the 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 6773
Email: TDelairewa@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 **Delivered Duty Paid (DDP) basis or Free In Store (FIS) basis**. The point of delivery shall be **FEA's Kinoya Depot in Suva**. The term DDP shall be governed by the rules prescribed in the current edition of Incoterms (i.e. the eighth version - Incoterms 2010), 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 180 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 initialled 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 initialled 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 6773
Email: TDeலைrewa@fea.com.fj

And

- b) bear the following identification:

Bid for: Preferred Supplier for Design, Manufacture, Testing and Supply of Cable Accessories, Jointing and Outdoor Termination Kits for 33kV power Cables.

- Bid Tender Number: **MR 69/2018**
- DO NOT OPEN BEFORE: 1600hrs on **Wednesday 14th March, 2018**

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) **14/3/2018**

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.

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.

Lowest bid will not necessarily be accepted as successful 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 in.

3 References

3.1 Applicable Standards

The items shall be designed, manufactured and tested in accordance with the latest revision of all relevant IEC, New Zealand and Australian Standards, and all amendments issues from time to time expect where varied by this specification.

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

STANDARD	DESCRIPTION
AS 1018	Partial discharge measurements
AS/NZS 1125	Conductors in insulated electric cables and flexible cords
AS/NZS 1660	Test methods for electric cables, cords and conductors
AS/NZS 3808	Insulating and sheathing materials for electric cables
AS/NZS 4026	Electric Cables - For underground residential distribution systems
AS/NZS 4325.1	Compression and mechanical connectors for power cables with copper or aluminium conductors - Test methods and requirements
AS/NZS 4805	Accessories for electric cables - Test requirements
CENELEC HD 629.1 S2	Accessories for electric cables - Test requirements Part 1: Power cables with extruded insulation for rated voltages from 1.9/3.3 (3.6) kV up to and including 19/33 (36) kV
AS/NZS ISO 31000	Risk management - Principles and guidelines
AS/NZS ISO 9001	Quality management systems - Requirements
AS 1931	High-voltage test techniques
AS 4068	Flat pallets for materials handling
AS 4169	Electroplated coatings - Tin and tin alloys (ISO 2093:1986, MOD)
AS 60270	High-voltage test techniques - Partial discharge measurements
AS 62271.301	High voltage switchgear and control gear - Dimensional standardization of terminals
AS ISO 1000	The international system of units (SI) and its application
ASTM D1603	Standard Test Method for Carbon Black Content in Olefin Plastic
IEC 60229	Electric cables - Tests on extruded over sheaths with a special protective function
IEC 60684	Flexible insulating sleeving
IEC 60721	Classification of environmental conditions
ISO/IEC 17025:2017	General Requirements for the competence of testing and calibration laboratories.
AS/NZS 1429 Parts 1 & 2	Electric cables - Polymeric insulated
IEC 61238-1	Compression and mechanical connectors for power cables with copper or aluminium conductors.
BS 6346	Specification for PVC Insulated Cables for Electricity Supply
ESI 09-13	Performance specification for high voltage heat-shrinkable components for use with high voltage solid type cables, up to and including 33 kV
IEEE 48	Standard test procedures and requirements for high voltage alternating current cable terminations
IEEE 404	Standard for power cable joints
IEC 60840 Ed. 2.0 b	Power cables with extruded insulation and their accessories for rated voltages above 30 kV (Um=36 kV) up to 150 kV (Um =170 kV) - Test methods and requirements

4 Definitions, Acronyms and Abbreviations

4.1 Definitions

For the purpose of this standard, the following definitions apply:

Term	Definition
Materials	Items, goods or product
Specification	This technical specification

4.2 Acronyms and Abbreviations

The following abbreviations and acronyms appear in this standard:

Abbreviation or Acronym	Definition
FEA	Fiji Electricity Authority
Al	Aluminium conductor
CONSAC	Sectorised shaped aluminium conductor 0.6/1kV cable with concentric aluminium sheath
Cu	Copper conductor
CWS	Copper Wire Screen
HDPE	High density polyethylene
LY	Lead alloy sheath
MDPE	Medium density polyethylene
NJ	Nylon jacket
PLY	Paper insulated lead alloy sheathed
PVC	Polyvinyl chloride
SWA	Galvanised steel wire armoured
SWS	Steel wire armoured and over sheathed
TR-XPLE	Tree retardant cross-linked polyethylene
WB	Water blocked
WBT	Water blocking tape (and / or yarns)
XPLE	Cross-linked polyethylene

5 Environment and Service Conditions

The conditions under which the terminating and jointing materials will be required to operate are:

1. Installed directly buried in fine grain bedding material, at a nominal depth of 1000 mm.
2. Ambient air temperature not exceeding 45°C as determined by a shaded thermometer.
3. Ambient ground temperature not exceeding 30°C.
4. An altitude not exceeding 1,000 meters above sea level.
5. A high humidity (95%) combined with a high temperature (35°C) followed by a sudden drop in temperature of up to 10°C.

Exposed terminating materials will be subject to the following additional service conditions:

1. Solar radiation intensity of 1,000W/m².
2. Tropical summer storms with high winds (Category 5 Cyclones - Saffir-Simpson hurricane wind scale (SSHWS)) and an annual rainfall in excess of 1,500 mm.
3. Areas of coastal salt spray and/or industrial pollution with equivalent salt deposits densities in the range of 2.0 - 3.0g/m².

6 33 kV System

The underground power cables used are 19/33kV three phase 50 Hertz system. The star point of FEA's 33kV system is impedance earthed either, through a resistor or via a neutral earthing reactor. The maximum system voltage (phase to phase) is 36 kV and the required impulse insulation level is 200kVp

6.1 Operating Conditions

Assembled components forming part of a supply system shall perform without distress under the following conditions:

- **Normal Operation** : Polymeric Insulated Cables - Continuous operation at a conductor temperature of 90°C
- **Emergency Operation** : Polymeric Insulated Cables - Operated at a conductor temperature of 105°C
- **Fault Conditions:** Able to withstand an earth fault duty compatible to the technical specification of the cable as per below table.

Cable	Fault Rating - Screen	Fault Rating - Conductor
300 mm ² Single Core Aluminium XLPE Insulated	10.2 kA for 1 sec	30 kA for 1sec
630 mm ² Single Core Aluminium XLPE Insulated	10.2 kA for 1 sec	60 kA for 1sec

- Polymeric Insulated Cables - Operation at a conductor temperature of 250°C

7 Design and Construction

Equipment offered that is found on inspection not to conform to this Specification shall be replaced by the vendor at no cost to Fiji Electricity Authority.

7.1 33kV Cable Types in FEA System

No.	33kV Cable Description
1	300 mm ² Single Core Aluminium XLPE Insulated
2	630 mm ² Single Core Aluminium XLPE Insulated

7.2 General

All joints and outdoor terminations, except for separable insulated connectors shall be of the heat-shrink, or cold-shrink, or cold-applied polymeric type design, manufactured and tested to meet the requirements of the relevant Standards, including AS/NZS 4805 Parts 1 and 2 or equivalent, and shall be suitable for application to Fiji Electricity Authority's 33kV cables.

All separable insulated connectors and accessories forming part of the connector system shall be of the dead-break shielded/screened type with a screen break, manufactured and tested to meet the relevant Standards, including AS 2629. The separable insulated connectors shall be suitable for connecting particular single core polymeric cables to provide 33kV test points adjacent to substation switchgear.

All joint and outdoor termination kits shall be supplied complete in unit lots suitably packaged for storage containing all necessary materials. Full detailed installation instructions specific to the cables shall be supplied with the Tender and with the jointing kits that are subsequently supplied. FEA will approve all instructions for kits that are purchased for use in FEA. Fiji Electricity Authority will keep a copy of the instructions for their records and the supplier is to supply a copy of the instructions with each kit.

Tenderers are required to offer bi-metal range taking kits suitable for either aluminium or copper conductors and utilising screwed connectors with shear head bolts or torque tightened bolts

All joint and outdoor termination kits shall be supplied with the required cleansing solvents, cloth and abrasives. Tenderers shall provide with their tender Safety Data Sheets (SDS) for nominated solvents. No unapproved solvents shall be provided without prior agreement of the Purchaser.

If required, sealants shall be supplied to effect seals on joints and terminations and shall be able to accommodate the creep or relaxation that may occur during installation of the accessories or during the normal cyclic loading of the cables. The sealant shall have adhesion properties to maintain hermetic seals at all times between components and the various cable sheath materials and connectors.

Suitable lubricant shall be provided with the kits for separable connectors (elbows, tee connectors and plugs) to facilitate separation of the connector from the bushing or plug socket.

All joints shall meet the performance requirements of this specification and have an outer serving which has a mechanical strength and electrical strength equal to that of the HDPE over sheath of the cable.

The outer serving shall provide a minimum insulation resistance of 100 MΩ.

Jointing ferrules shall be supplied with the jointing kits. Ferrules utilising a screwed connection shall be supplied with all bolts, pre-greased with a conductive grease and inserted in the connector, which in turn shall be protected from corrosion. Ferrules shall be water blocked

Tenderers shall complete Attachment 3 to state overall length of the completed joint and the required cable pit length to make the joint.

8 Specific Requirement for Outdoor Termination Kits

8.1 33kV Termination kit - outdoor type

The polymeric stress control sleeve and sheds shall withstand the electrical stress associated with continuous operation at 36 kV under the environmental conditions.

The termination shall be suitable for terminating cables on to a low mount substation structure and on to a pole using a bracket mounted with 36kV surge arresters for support of three single phase cable tails.

Where the cable description includes an extruded water barrier comprised of an Aluminium / PE Laminate Tape the purchaser requires the water / environmental seal to the cable to be to the LAT. It is the purchaser's preference that the LAT is clamped to the screen of the cable.

Methods for achieving the environmental seal and managing induced voltages on the LAT shall be submitted with full details and supporting evidence of performance including service history.

The kits shall be supplied with phase identification components which can be applied to the phase cores and which are compatible with the terminating materials.

Fully sealed terminal connectors are to be supplied with the kits and shall be of the following type:

-

- Lug palms shall be supplied with fully sealed palms and shall have one hole, suitable for a M12 bolt.
- All lugs should preferably be screwed connectors with shear head bolts in lieu of compression lugs.
- TR-XPLE / XLPE Insulated cables shall have bi-metallic or tinned aluminium lugs for the phase conductors and tinned copper or brass lugs for the screen wires.
- Lugs shall meet the test requirements of AS/NZS 4325.1.

Where offered, compression terminal connectors shall be capable of being installed using FEA's current Cable Lug Crimpers.

9 Specific Requirements for Joints

9.1 Water Blocking Capability of Joints

FEA requires all cable joints to incorporate an effective water blocking mechanism in order to limit the extent of water migration through the cable network following a cable fault or cable damage. This requires all joint designs to prevent the transmission of water in any direction between the joints and their associated cables. The transmission of water from a cable to a joint can be between the conductor strands, or in the interstices around the screen wires, or between cores in the case of a three core cable, or between the various layers of sheathing materials.

This clause does not preclude the requirement for measures to protect joints against direct water entry from the external environment.

9.2 Metallic Screening

All joints shall include a full metallic screen for the entire length of the joint. The metallic screen shall sufficiently contact the copper wire screen to ensure continuity. The metallic screen shall not be exposed to the external environment, and shall be waterproofed and protected against possible galvanic corrosion.

The metallic screen shall also be insulated from the external environment. The insulating medium shall be capable of withstanding 10kV DC applied between metallic screen and earth for at least one minute. Test reports shall be provided to demonstrate compliance

9.3 Metallic Screen - continuity, fault rating, mechanical testing and connector material

The method and materials used for the continuity of metallic screens and metallic sheaths shall be suitable for the maximum earth fault levels involved.

Test documentation shall be provided to demonstrate compliance.

The cable copper wire screen and connector shall not be prone to corrosion in the presence of water. In the case of plated alloys it shall be assumed that the plating has been damaged for the purposes of this clause. The connector material and the method used for the continuity of copper screen wires shall be stated.

9.4 Compatibility of Materials

The materials and installation techniques of the joints shall be physically, chemically, electrically and thermally compatible with the relevant cable materials. Compatibility shall also be maintained throughout the entire operating temperature range.

Where heat shrink technology is offered, the components shall shrink with a minimal amount of heat to avoid damaging adjacent cable and/or joint components. The material shall shrink uniformly and set without the tendency to creep or crack. All items shall be capable of being stored without damage or deterioration at temperatures up to 50°C.

9.5 Product Installation - physical requirements

The physical requirements of the work environment/s required to install each of the offered products shall be provided. All dimensions are to be in millimetres, the location of the cable/s and joint centre in relation to the provided dimensions shall be specified. This shall include, but not be limited to the following:

- Minimum excavated joint bay length, width and height
- Minimum pit dimensions (length, width and height)
- Minimum straight length of cable (for sliding back sleeves, etc)
- Any limitations or specific occupational health and safety issues associated with the installation of the product/s in a Confined Space environment as defined in the New South Wales Occupational Health and Safety Regulation 2001
- The total weight of the joint components
- The approved method for supporting the joint in a pit and duct environment

10 Ancillary Equipment

All items necessary to this specification and not included in the items previously specified shall be termed “Ancillary Equipment”.

The Tenderer shall list such items. A quantity and price shall be shown for each individual item to allow a review of requirements at the time of ordering.

11 Quality Assurance

It is expected that manufacturers will have a quality system certified to ISO 9002 in operation.

Documentary evidence shall be provided concerning the level of Quality System Certification associated with the Tenderer and/or Manufacturer. This documentation shall include the Capability Statement associated with the Quality System Certification.

12 Test Requirements and Supporting Evidence

The various categories of products included in this specification have different test and performance requirements. Some of these requirements are in accordance with certain Australian Standards. Where the products offered have been tested to different industry standards, the supplier shall detail the differences between the two standards, and provide a copy of the relevant parts of the standard to which the products have been tested.

Full technical information shall be provided in support of all the products offered. Where sufficient information is not provided to allow a full technical appraisal of a product, and the tenderer does not furnish such information or respond to FEA's requests for such information within a reasonable timeframe, the product involved will be regarded as technically un-assessable and will not be given any further consideration for the purpose of this tender.

Test shall be carried out in accordance to the standards stipulated in Section 3 of this document by a testing laboratory which is certified to ISO\IEC 17025:2017 standards. The testing laboratory must be certified for testing to the relevant standard for the offered products. In addition a copy of the testing laboratories certification shall be provided. All test reports and supporting evidence shall be provided in English.

12.1 Batch and Routine Tests

If tenderers propose to offer items tested to Standards other than those specified in this specification, full details of these Standards are to be provided at the time of tendering.

12.2 Acceptance Tests

FEA may carry out acceptance tests on an item to prove it conforms to the requirements of this Specification.

12.3 Witnessing of Test

FEA reserves the right to witness all testing. The Supplier shall give FEA reasonable notice of when testing will be carried out.

12.4 Electrical

The Tenderer shall supply terminations that meet the test requirements of the relevant Standards, including AS/NZS 1660 - All Parts, AS/NZS 4325.1 , ISO/IEC 17025:2017 and IEC61442, and shall complete Attachments.

The terminations and joints shall withstand the electrical stress associated with continuous operation at the highest system voltage under the environmental conditions.

12.5 Mechanical & Environmental

Impact Test: The joint shall be stood upon a hard base e.g. a concrete slab floor. A wedge shaped weight of 4 kg having a 90° angle with a 2mm radius impacting edge shall be dropped freely 6 times from a height of 2 metres on to the sample so that the impacting edge is horizontal and at right angles to the axis of the joint. The drops shall be distributed over the length of the joint. **There shall be no visible damage of the joint which may affect the function of the joint in service.**

13 Additional Requirements

13.1 Service Life

The Equipment offered shall have a service life in excess of 50 years in the installed environment. Evidence of service life shall be provided.

13.2 Shelf Life and Special Storage Requirements

Where special storage requirements are necessary, such requirements shall clearly mentioned in the bid and also be stated on the packaging. These special storage requirements shall be detailed in the tender submission.

13.3 Packaging and Labelling

- Each kit shall consist of the correct number, length and size of components. Each kit shall include an itemized checklist of components and the component quantities. Each kit shall include an installation instruction as detailed in this specification.
- Each component in each kit shall be suitably labelled for easy identification. If required, to ensure product quality, components shall be individually packaged within the kit. The terminology used for labelling shall be consistent with the terminology used in the itemized list of components and the installation instruction.
- The full kit package shall be labelled with the supplier's name, the supplier's part number, manufacturing date, FEA's stock code number, a short kit description providing the range taking capabilities of the joint and outdoor termination kits. The application range shall include the conductor type, conductor cross-sectional area in square millimetres and the insulation diameter range. Successful tenderers will be required to provide details of proposed kit labels to FEA for approval prior to entering into a supply agreement.
- The packaging shall protect the contents against dust and moisture, and shall be robust enough to protect the enclosed components against potential delivery and handling damage.
- The packaging materials shall be suitable for preventing product degradation during storage.

13.4 Packaging and Marking

Supplier shall provide specific details of packaging and delivery of palletised goods. Each container shall include the manufacturer's recommended installation procedure document.

Each packaged lot and each kit within the packaged lot be marked with the following information: -

Marking Required on Each Kit	Marking Required on Each Packaged Lot
Names of Supplier/Manufacturer	Names of Supplier/Manufacturer
Product Code	Product Code
Item Description	Item Description
FEA Stock Code	FEA Stock Code
Quantity : I kit	Pack Size: No. of Kits
Date of Manufacture	Date of Manufacturer
Use before date if applicable	Pack Mass (kg)

All items shall be packaged so that the materials can be transported and delivered in an undamaged condition. Damaged goods will not be accepted.

Materials shall be protectively enclosed in sealed polythene bags.

13.4 Consultancy Service

Tenderers shall also provide a consultancy service to solve problems with jointing or terminating older existing cables in FEA's network.

14 Information to be supplied

14.1 Installation Instructions

Complete installation instructions shall be provided in each kit for the assembly of all components in the associated joint and outdoor termination kit. A copy of the installation instructions shall be included in the offer.

The instructions shall also provide the necessary details for the removal of water swellable tapes and graphite as required. The distance of graphite removal shall be sufficient to prevent tracking on the surface of the cable sheath during serving integrity testing (10kV DC maximum for a duration of one minute). The instructions shall also include the protection of components from graphite contamination whilst parked on the cable sheath during the joint assembly process.

Installation instructions shall be consistent with FEA current jointing practices, and shall include graphics and dimensions in millimeters where appropriate. FEA reserves the right to modify the suppliers' jointing instructions for inclusion in any or all of the joint kits. Any such modifications will be carried out in consultation with, and to the satisfaction of the supplier. There shall be no charges raised by the supplier/s for the approval of any such modifications.

14.2 Environmental Considerations

Suppliers are required to comment on the environmental soundness of the design and the materials used in the manufacture of the items offered. In particular, comments should address such issues as recyclability and disposability of used or unused materials supplied in the jointing and terminating kits.

14.3 Traceability

The Suppliers shall determine which sub-components in their plant require traceability and shall indicate these in the Schedule of Guaranteed Performance. The criteria for traceability shall be based on previously identified failure modes which may necessitate the recall of plant from service for rework or replacement should they occur either in the field or are discovered during manufacture or testing at works. The Purchaser will give due recognition to the number of sub-components incorporating traceability when assessing conformance of the Suppliers' Quality Assurance System to the specified requirements.

14.4 Training

Training material in the form of jointing and terminating kits, drawings, instructions and/or audio visuals shall be provided for the items accepted under the offer at the successful Tenderer's cost. This material shall include but is not limited to the following topics:

- Handling
- Storage
- Application (particularly in areas of heavy coastal pollution)
- Installation (including insect protection where applicable)
- Maintenance
- Environmental performance
- Electrical performance
- Mechanical performance
- Disposal

Tenderers shall provide at their cost, qualified training instructors to undertake training of FEA's cable jointers and other personnel at the commencement of the contract. The training shall be competency based with the successful tenderer being responsible for ensuring that trainees have obtained the required skill for installation of the jointing and terminating materials and that an accreditation certificate is issued to indicate successful completion of the training program.

Training will only be required for personnel who are currently accredited as cable jointers.

Cable samples will be provided by FEA for all the training sessions.

Training shall be undertaken in FEA's facility in Suva for which the training centre will not charge for use of the facilities.

Tenderers shall also provide assistance in undertaking compliance audits to ensure that the training provided was adequate and that the materials are being installed to the required standard.

14.5 Samples and Lead Time Delivery

Tenderers must submit, when requested, one (1) production samples of each item tendered to assist in the evaluation of the tender. Samples shall be delivered to the address nominated within ten (10) working days of the request.

The requirement for the samples may be waived for the following condition:

- The tendered item is currently under contract or has previously been supplied to the FEA under contract and there has been no changes to the design or material.
- The tendered items have been supplied to the FEA for the approval prior to this tender and there have been no changes to the design or material.

Each sample shall be delivered freight free, suitably packaged and labelled with the following information: -

Name of Tenderer and this Contract No. XXXXX
Contract Item Numbers
Any supporting data on features or characteristics

14.6 Reliability

Suppliers are 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 environment conditions

Tenderers shall provide evidence in support of the reliability and performance claimed including information of Failure Mode and Effect Analysis with the tender.

14.7 Technical Requirement in the Attachment

The specific technical requirements for the items offered shall be as stated in Attachments "1" to "6" of this specification. The supplier shall provide all details requested by Attachments "1" to "6" and shall guarantee such data.

Tenderers shall supply one copy of a general jointing and termination instruction with the tender documents together with drawings of not less than 1/4 scale fully describing the joints offered.

14.8 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 joint and outdoor termination Kits will depend on the FEA's project works and for operation and maintenance purposes. An estimate movement of joint and outdoor termination kits is outlined in the table below:

FEA Stock Code	Item Description	Unit Measure	of	3 years Usage
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I04671	Term Kit Outdoor 33kV 1 Core XLPE 185mm - 300mm sq. with mech connectors.	Each	68
I04671	Term Kit I/D 33kV XLPE 1 core 185mm - 300mmsq C/W mechanical connectors	Each	13
I04678	End Caps to Suite 240mm- 300mm Cables (heat Shrink End Cap 10 - 52mm)	Each	1018
I04720	33kV I core XLPE 150-300mm Joint (33kV 1 Core XLPE Inline Joint Kit c/w mechanical connectors)	Each	273
I04720	MODPACK for jointing 33kV CWS to I core AWA	Each	79
I04722	Inline Cable Jointing kit 33kV single Core 630mmsq compacted AL XLPE power cable	Each	133
I04689	33kV Outdoor Termination 630mm sq with mechanical connectors	Each	6

14.9 Cable Jointing and Termination Tools

Bidders shall submit an exhaustive list of the set of professional tools and equipment required for performing the entire cable jointing and termination. Bidders shall provide prices, product brochures, and technical details of each item in the set. The FEA intends to purchase 4 complete set of tools required for executing the entire cable jointing. Manual tools in lieu of power tools shall be preferred.

14.10 Drawings & Information to be supplied by the Successful Tenderer

All information to be supplied under this specification shall be in the English language and all drawings shall be dimensioned in metric units in accordance with AS ISO 1000. Where a drawing is dimensioned in imperial units, the equivalent metric units shall be shown in brackets adjacent to it.

When requested by the Purchaser, the Supplier shall:

- Provide within two (2) weeks of the date of the formal execution of the Standing Order, a comprehensively detailed program of works indicating timing for all activities required to achieve contract performance.
- Within six (6) weeks from the date of the formal execution of the Standing Order, the Supplier will provide three copies of drawings and information necessary to enable the Purchaser to examine the general design and arrangement.

The Purchaser will comment on drawings supplied under this contract in relation to how the equipment interfaces with the Purchaser's design, construction, operation, maintenance and other requirements.

Comments about drawings by the Purchaser will not in any way absolve the Supplier of responsibility for the safety and reliability aspects of the plant or equipment supplied. The Supplier will amend the drawings as directed and resubmit them to the Purchaser within one (1) week.

In the event of the Supplier proceeding with work before such comment has been given in writing, any necessary alterations and modifications will be carried out at the Tenderer's own expense.

Drawings will include a fully dimensioned general arrangement drawing.

If the drawings submitted for approval require modification by either the Supplier or the Purchaser, the Supplier shall carry out the modifications and submit the modified drawings for comment. This procedure shall continue until the Purchaser notifies the Supplier that the drawings are acceptable.

When requested by the Purchaser, the Supplier shall supply no later than four weeks prior to the date of dispatch of the equipment from the supplier the following:

- Final copies of all drawings listed in this section of the specification.
- Final Inspection and Test Plan covering at minimum the manufacturing and packaging procedures.
- Certified copies of test reports called for in this specification verifying compliance with this specification.

15 Pricing

Prices shall be quoted on a Delivered Duty Unpaid Basis, exclusive of all applicable taxes import/customs duties, etc. Bidder to state currency which the prices have been quoted and port of Delivery to Lautoka. Cost of freight and insurance shall be borne by the manufacturer.

Item	Description	Unit Price
I04671	Term Kit Outdoor 33kV 1 Core XLPE 185mm - 300mm sq. with mech connectors.	
I04678	End Caps to Suite 240mm- 300mm sq Cables (heat Shrink End Cap 10 - 52mm)	
I04720	33kV I core XLPE 150-300mm Joint(33kV 1 Core XLPE Inline Joint Kit c/w mechanical connectors)	
I04720	MODPACK for jointing 33kV CWS to I core AWA	
I04722	Inline Cable Jointing kit 33kV single Core 630mmsq compacted AL XLPE power cable	
I04689	33kV Outdoor Termination 630mm sq with mechanical connectors.	
Total Price		

Attachment 1: Tenderer's Experience

1 Major Clients

Tenderer should provide a list of current or recent major clients/customers where the Tenderer is supplying goods/services comparable to the goods/services offered. In providing these details the following information should be provided where applicable:

- client name;
- project details,
- location of project;
- size and complexity;
- time frame of project;
- major vendors and suppliers involved;
- value of project;
- reference persons including contact details; and
- other matters of relevance.

Confirmation information provided:

2 References

Tenderer should provide the names and contact phone numbers of at least 3 current referees

Reference 1:

Name:

Details:

Phone Number:

Email Address:

Reference 2:

Name:

Details:

Phone Number:

Email Address:

Reference 3:

Name:

Details:

Phone Number:

Email Address:

Attachment 2 - Technical Details - 33kV Terminations (Outdoor)

	Response
Item No. (Refer Annex A)	
Manufacturer's Name and Address	
Country of Manufacturers	
Manufacturer's Catalogue No.	
Type Test Certificate No.	

Particulars	Unit	Specified Value/ Requirement	Response / Guaranteed Value
Type Offered	Cold / Heat / Pre-moulded		
Rated Voltage	kV		
15 minute dry A.C. Voltage Withstand	15 min at 2.5 U _o (45kV)	No breakdown or flashover	
5 minute dry A.C. Voltage Withstand	5 min. at 4.5 U _o (81kV)	No breakdown or flashover	
(Outdoor Only) A.C. Voltage withstand wet	1 min at 4 U _o (72kV)	No breakdown or flashover	
15 minute dry D.C. Voltage Withstand	15 min at 4 U _o (72kV)	No breakdown or flashover	
Partial Discharge - maximum	1.73 U _o (30kV)	10 pC max.	
Impulse Level	170kV	No breakdown or flashover	
Type of Lug	Mechanical / Compression		
Lug Manufacturer			
Lug Manufacturer's part number			
(Compression Lug Only) Across Flat Distance of the Die	mm		
Lug Conductor diameter range	mm		
Tail Lengths	mm		
Creepage Distance	mm		
Colour of housing / Sheds			
Diameter over cable insulation range	mm		
Detailed Instructions to suit type and voltage included in kits	Yes / No		
Terminal insulation removable and reusable for testing of switchgear	Yes / No		
Pack Size			
Pack Mass	kg		
Shelf Life	Years		

Labour estimate to complete termination	hours		
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Name of Tenderer:	
Signature of Tenderer:	
Date:	

ATTACHMENT 3 - Technical Details - 33kV Joints

NOTES: A separate schedule is to be provided for each item offered except for details common to all items which only need to be provided once.

	Specified Requirements	Guaranteed Value
Item No.		
Manufacturer's Name and Address		
Country of Manufacture		
Manufacturer's Catalogue No.		
Type Test Certificate No.		
Rated Voltage		
AC Withstand (72 kV)	1 Minute	
Impulse (peak) (200 kV)	No Flashover	
DC Withstand (72 kV)	15 Minutes	
AC withstand (81 kV)	5 Minutes	
Partial Discharge - maximum (30 kV)	10 pc	
Impact Resistance (Wedge dropped 2m)	No damage	
Internal Pressure Resistance (PLY) kPa	hours	
Type of Connector (Mechanical /Compression)		
Cold Applied Insulating components (yes/no)		
Fully Metallic Screened (yes/no)		
Re-enterable (yes/no)		
Overall Length/Required Pit Length mm		/
Detailed Instructions to suit cable type and voltage included in kits (yes/no)		
Pack Size		
Pack Weight (kg)		
Shelf Life (years)		
Labour Estimate to complete joint (hours)		
Any other Information which the supplier wishes to provide.		

NAME OF TENDERER: _____

ATTACHMENT 4 - Technical Documentation Checklist

CLAUSE Ref.	PARTICULARS	UNITS
Have full and comprehensive details been submitted WITH the tender documents associated with each of the following items?		
7, 8 & 9	Design and Construction	
11	Quality systems of BOTH the SUPPLIER and the MANUFACTURER	Yes/No
12	Test Requirements	Yes/No
13.1 & 13.2	Service Life	Yes/No
13.3 & 13.4	Packaging	Yes/No
14.2	Environment Consideration	
14.4	Training materials	Yes/No
14.6	Reliability	Yes/No
15	Pricing	Yes/No

SIGNATURE OF TENDERER

ATTACHMENT 5: 630mm² AL Single Core XLPE Cable

DESCRIPTION	Single core, 630 mm ² aluminium conductor, TR-XLPE insulation (with semi conductive screens), Copper Wire screen, PVC/MDPE sheath, 19/33 kV, cable.
Applicable Standards:	AS/NZS 1429.1:2006, IEC60502.2, IEC60949 All applicable AS/NZS Standards and IEC Standards and all standards therein referred to.
Application:	Direct Burial in Soil
Name of Manufacturer:	Olex New Zealand Limited
Cable Armour:	NONE
Rated Voltage:	19/33kV(36kV)
Conductor Current Rating (In Air): (Trefoil arrangement Ambient Air Temperature 30 °C Screens bonded both ends)	890 Amps
Conductor Current Rating (Direct Buried): (Trefoil arrangement and Direct buried in soil Ambient Air Temperature 30 °C Soil Temperature 15 °C Soil Thermal Resistivity 1.2 K.m/W Depth of Burial 1.0 m Screens bonded both ends)	650 Amps
Conductor Current Rating (In Duct): (Installed in trefoil arrangement in HD PCV Duct (Conduit) of 200mm Dia Ambient Air Temperature 30 °C Soil Temperature 15 °C Soil Thermal Resistivity 1.2 K.m/W Depth of Burial 1.0 m Screens bonded both ends)	600 Amps
Conductor Short Circuit Current Rating (1s)	59kA minimum
Conductor Short Circuit Current Rating (3s)	34kA minimum
Number of Conductor Cores:	Single (1)
Conductor Material:	Aluminium compliant with AS/NZS 1125
Minimum Conductor Area	630mm ² (Compacted)

No. of Strands and Wire Diameter	Per Applicable Standards listed above
Shape of Conductor	Per Applicable Standards listed above
Conductor Diameter	Per Applicable Standards listed above
Metal Screen Material and type: (This screen shall act as a return path for capacitive charging current and induced circulating currents under normal operating conditions. The screen shall also carry short circuit current in the event of an electrical fault in the circuit)	Annealed Copper compliant with AS/NZS 1125, and helically applied over the semi-conductive insulation screen.
Metal Screen Current Rating (1s)	10kA calculated as per applicable standards listed above
Metal Screen Current Rating (3s)	5.77kA calculated as per applicable standards listed above
Conductor Screen: (Semi-conductive cross-linked polymeric material applied over the conductor and bonded to the insulation to provide smooth circular interface between the conductor and insulation and eliminate stress concentrations)	Semi-conductive XLPE
Conductor Screen Thickness	Per Applicable Standards listed above
Insulation Type	Cross Linked Poly Ethylene (XLPE) tree-retardant grade, with projected useful life exceeding 40 years
Insulation Radial Thickness	Per Applicable Standards listed above
Diameter over Insulation	Per Applicable Standards listed above
Insulation Screen	Semi-conductive cross-linked polymeric material which adheres firmly to the insulation, yet remains readily strippable by hand for jointing and terminating
Insulation Screen Thickness	Per Applicable Standards listed above
Screen Bedding	Per Applicable Standards listed above
Sheath Material	Dual sheath of PVC/HDPE
Sheath Thickness	Per Applicable Standards listed above
Sheath Radial Thickness	Per Applicable Standards listed above
Sheath Colour	Black
Nominal Conductor Diameter	29.9 mm
	0.047 (Ω /km) or better

Maximum DC Conductor Resistance @ 20° C					
Maximum AC Conductor Resistance @ 90° C and 50Hz	0.0630 (Ω/km) or better				
Inductive Reactance at 50 Hz	0.100 (Ω/km) or better				
Conductor to Screen Capacitance	0.35 (μF/km) or better				
CABLE MANUFACTURER'S SPECIFICS					
Components :	Conductor		630 mm ²		Al
	Conductor screen	(minimum point)	0.30	mm	SCXLPE
	Insulation	(minimum point)	7.10	mm	TR-XLPE
	Insulation screen	(minimum point)	0.60	mm	SCXLPE
	Metallic screen		48 x 1.35	mm	Copper Wire
	Sheath		1.3/1.4	mm	PVC/MDPE
Diameters :	Conductor	(minimum)	29.7	mm	
	Insulation		46.3	mm	
	Insulation screen		47.9	mm	
	Overall		56.3	mm	
Mass of cable :			4,010	kg/km	
Minimum bending radii :	Fixed		680 mm		
	During installation		1010	mm	
Maximum pulling tensions :	On conductors together		20.0	kN	
	With pulling stocking		6.80	kN	
DC resistances @ 20° C :	Conductor		0.0469 ohms/km		
	Metallic screen		0.264 ohms/km		
Reactance to neutral @ 50 Hz :			0.0999 ohms/km		
Capacitance to neutral :			0.361 mfd/km		
Fault Ratings (1 s duration) :	Conductor		59.5 kA		
	Metallic screen		10.0 kA		

ATTACHMENT 6: 300mm² AL Single Core XLPE Cable

DESCRIPTION	Single core, 300 mm ² Compacted Al conductor, XLPE insulation (with semi conductive screens), 3.0 kA, (20 mm ²) Cu wire screen, PVC/MDPE sheath (OG/BK). 19/33 kV cable.
Applicable Standards:	AS/NZS 1429.1:2006, IEC60502.2, IEC60949 All applicable AS/NZS Standards and IEC Standards and all standards therein referred to.
Application:	Direct Burial in Soil
Name of Manufacturer:	Olex New Zealand Limited
Cable Armour:	NONE
Rated Voltage:	19/33kV(36kV)
Conductor Current Rating (In Air): (Trefoil arrangement Ambient Air Temperature 30 °C Screens bonded both ends)	513 Amps
Conductor Current Rating (Direct Buried): (Trefoil arrangement and Direct buried in soil Ambient Air Temperature 30 °C Soil Temperature 15 °C Soil Thermal Resistivity 1.2 K.m/W Depth of Burial 1.0 m Screens bonded both ends)	428 Amps
Conductor Current Rating (In Duct): (Installed in trefoil arrangement in HD PCV Duct (Conduit) of 200mm Dia Ambient Air Temperature 30 °C Soil Temperature 15 °C Soil Thermal Resistivity 1.2 K.m/W Depth of Burial 1.0 m Screens bonded both ends)	381 Amps
Conductor Short Circuit Current Rating (1s)	28.4 kA minimum
Conductor Short Circuit Current Rating (3s)	16.39 kA minimum
Number of Conductor Cores:	Single (1)
Conductor Material:	Aluminium compliant with AS/NZS 1125
Minimum Conductor Area	300mm ² (Compacted)

No. of Strands and Wire Diameter	Per Applicable Standards listed above
Shape of Conductor	Per Applicable Standards listed above
Conductor Diameter	Per Applicable Standards listed above
Metal Screen Material and type: (This screen shall act as a return path for capacitive charging current and induced circulating currents under normal operating conditions. The screen shall also carry short circuit current in the event of an electrical fault in the circuit)	Annealed Copper compliant with AS/NZS 1125, and helically applied over the semi-conductive insulation screen.
Metal Screen Current Rating (1s)	10.2 kA
Metal Screen Current Rating (3s)	5.88 kA
Conductor Screen: (Semi-conductive cross-linked polymeric material applied over the conductor and bonded to the insulation to provide smooth circular interface between the conductor and insulation and eliminate stress concentrations)	Semi-conductive XLPE
Conductor Screen Thickness	Per Applicable Standards listed above
Insulation Type	Cross Linked Poly Ethylene (XLPE) tree-retardant grade, with projected useful life exceeding 40 years
Insulation Radial Thickness	Per Applicable Standards listed above
Diameter over Insulation	Per Applicable Standards listed above
Insulation Screen	Semi-conductive cross-linked polymeric material which adheres firmly to the insulation, yet remains readily strippable by hand for jointing and terminating
Insulation Screen Thickness	Per Applicable Standards listed above
Screen Bedding	Per Applicable Standards listed above
Sheath Material	Dual sheath of PVC/MDPE
Sheath Thickness	Per Applicable Standards listed above
Sheath Radial Thickness	Per Applicable Standards listed above
Sheath Colour	Black
Nominal Conductor Diameter	20.1 mm
Maximum AC Conductor Resistance @ 90° C and 50Hz	0.129 (Ω /km) or better

Inductive Reactance at 50 Hz	0.121 (Ω /km) or better				
Conductor to Screen Capacitance	0.242 (μ F/km) or better				
CABLE MANUFACTURER'S SPECIFICS					
Components :	Conductor		300 mm ²		Al
	Conductor screen	(minimum point)	0.30	mm	SCXLPE
	Insulation	(minimum point)	7.10	mm	TR-XLPE
	Insulation screen	(minimum point)	0.60	mm	SCXLPE
	Metallic screen		36 x 0.85	mm	Copper Wire
	Sheath		1.2/1.2	mm	PVC/MDPE
Diameters :	Conductor	(minimum)	20.36	mm	
	Insulation		36.6	mm	
	Insulation screen		38.2	mm	
	Overall		45.2	mm	
Mass of cable :			2,202	kg/km	
Minimum bending radii :	Fixed		570	mm	
	During installation		860	mm	
Maximum pulling tensions :	On conductors together		15.0	kN	
	With pulling stocking		5.42	kN	
DC resistances @ 20°C :	Conductor		0.100 ohms/km		
	Metallic screen		0.888 ohms/km		
Reactance to neutral @ 50 Hz :	0.110 ohms/km				
Capacitance to neutral :	0.268 mfd/km				
Fault Ratings (1 s duration) :	Conductor		28.3 kA		
	Metallic screen		10.2 kA		

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 14th March, 2018**

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 addition, 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 14th March, 2018**- Addressed as

Tender – MR 69/2018 Design, Manufacture, Testing & Supply of Cable Accessories, Outdoor, Termination & Jointing Materials for 33kV Power Cables

**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 hard copy is dispatched to courier before the closing date and time. Please note courier submission date should be forwarded to FEA with your bid.**

Tenders received after **4:00pm** on the closing date of **Wednesday 13th March, 2018**

- will not be considered.
- Lowest bid will not necessarily be accepted as successful bid
- **It is the responsibility of the bidder to pay courier chargers and all other cost associated with the delivery of the hard copy of the Tender submission including any Duties/Taxes. Hard copies of the Tender submission via Post Box will not be considered.**