



**THE HASHEMITE KINGDOM OF JORDAN
THE JORDANIAN ELECTRIC POWER COMPANY LIMITED**

SPECIFICATION JEP 72/2020

**TENDER DOCUMENT FOR
OVERHEAD LINE FAULT INDICATORS**

TENDERER'S NAME: _____

ADDRESS: _____

CLOSING DATE: _____

CLOSING TIME: _____

OCTOBER 2020

LIST OF ABBREVIATIONS

BS	British Standards
IEC	International Electrotechnical Commission
JEPCO	The Jordanian Electric Power Company Limited

FORM OF TENDER
THE JORDANIAN ELECTRIC POWER COMPANY LIMITED
TENDER FOR CONTRACT NO JEP 72/2020
OVERHEAD LINE FAULT INDICATOR

(Tenderers are required to fill up the blank spaces in this Tender Form and Schedules)

The General Manager,
The Jordanian Electric Power Company Limited,
P.O. Box 618,
Amman 11118,
The Hashemite Kingdom of Jordan.

1. Having examined the Drawings, Conditions of Contract, Specification and Schedules for the execution of the above-named Goods, we, the undersigned, offer to execute, complete and remedy defects in the whole of the said Goods in conformity with the said Drawings, Conditions of Contract, Specification and Schedules for the sum of

(Figures.....)

or such other sum as may be determined in accordance with the said conditions.

2. We agree to abide by this Tender for the period of 120 days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
3. We undertake if our Tender is accepted to complete and deliver the whole of the Goods comprised in the Contract within week(s) subject to the said Conditions.
4. If our Tender is accepted we will obtain the guarantee of an Insurance Company or Bank or other sureties (to be approved by you) to be jointly and severally bound with us in a sum not exceeding 10 per cent of the above named sum for the due performance of the Contract under the terms of a Bond to be approved by you.

We propose the following Bank or Insurance Company as surety (or sureties) in this respect:

(.....)

(.....)

(.....)

5. Unless and until a formal Agreement is prepared and executed, this Tender, together with your written acceptance thereof, shall constitute a binding Contract between us.
6. We undertake to provide a defects guarantee period as stated in Clause 15 of the conditions of contract for each section of the Plant from the date of delivery to the Port of Aqaba, or such other destination that may be stated in the Contract.
7. We understand that you are not bound to accept the lowest or any Tender you may receive.

8. Tenderers must give details of their representative or associated companies in the Hashemite Kingdom of Jordan who will deal with this Contract if it is awarded to the Tenderer:

Name and Full Address of Representative:
Telephone Number
Fax Number
Telex Number

9. APPENDIX TO TENDER

	Clause	
Time for completion	10.1	..... weeks
Amount of Bond or Guarantee	7.1	10% of Contract sum
	11.1	Full replacement value + 10%
Amount of reduction per week of delay	23.1	1% of Contract Price
Maximum reduction	23.1	10% of Contract Price
Defects Liability Period	15.2	.....
Use of Goods assumed		..... 24 hours per day
Name and address of Tenderer's Bank		.....
	
	

Dated this day of 20...

Signature in the capacity of

duly authorized to sign tenders for and on behalf of

Witness Address

Occupation

1. SCOPE OF WORK

1.1 Definite work

The works shall comprise the design, manufacture, testing and delivery to the Port of Aqaba, The Hashemite Kingdom of Jordan of the equipment listed in this Specification, equipment in accordance with the Conditions of Contract at prices stated in the Schedule of this Specification, together with the provision of certain specified spares.

Item No.	* Description	Quantity
1.A	33&11 kV Overhead Line Fault Indicators	500 Each
1.B	33&11 kV Overhead Line Fault Indicators with the possibility to communicate with SCADA system.	
2.	Hot Insulation stick for Fault Indicator Installation (adjustable length (8-12) m working height)	6

Notes:

- JEPCO has the right to award either option 1.A or 1.B or a combination of them.
- The Tenderer shall submit his offer in two forms; one hard copy and one soft copy on "CD" as a pdf file in a closed envelope. Both copies shall be exactly identical and shall include complete documentation necessary for evaluation such as technical and commercial information, schedules and drawings.
- Three non-returnable samples shall be submitted with the offer for evaluation purposes. Failure to submit the samples will entitle jepco to consider the offer non-responsive.
- Documents to be submitted as an integral part of the offer, and to be evaluated with the tender:
 1. Full technical details, drawings and catalogues of the items required herein.
 2. Complete Test certificates to ensure that the indicators comply with the requirements of this specification.
 3. Fully detailed reference list with contact details.
 4. ISO certificate and any other documents that may assist in the evaluation.
- The above items shall be provided with a bar code of 128 type C that represents the primary and secondary number of these items, as shown in the table below:

Item No.	Item Code
1.	07712202

2. SITE AND DESIGN PARTICULARS

2.1 Particulars of system

The following are the particulars of the systems on which the equipment covered by the Specification shall operate:-

- i. 33 kV 3-phase at a frequency of 50 Hz with the neutral point resistance earthed.
- ii. 11 kV 3-phase at a frequency of 50 Hz with the neutral point solidly earthed.
- iii. 400 volts 3-phase and neutral at a frequency of 50 Hz with the neutral point solidly earthed.

2.2 Electrical design data

2.2.1 System particulars

Nominal system voltage between phases	kV	33	11	0.400
Highest system voltage	kV	36	12	0.440
System fault level	kA	25	25	50*
Earthing system		Resistance earthed	Solidly earthed	Solidly earthed
System frequency	Hz	50	50	50

2.2.2 Equipment withstand voltage

i.	Outdoor bushings, insulators and pole mounted transformers				
	Impulse withstand voltage (1.2/50 μ s wave) peak	kV	250	95	-
	Power frequency withstand voltage	kV	95	38	-
ii.	All other equipment excluding pole mounted transformers				
	Impulse withstand voltage (1.2/50 μ s wave) peak	kV	170	75	-
	Power frequency withstand voltage	kV	75	28	-

* Unless otherwise specified.

2.2.3 Outdoor bushing and insulator creepage distances

Minimum creepage distance	mm	1089	400	-
Protected creepage distance	mm	545	160	

2.2.4 Cable box clearances

The minimum cable box clearances under compound or oil shall be as follows:-

Nominal system voltage	kV	33	11	Below 1
Minimum clearance between phases	mm	125	45	20
Minimum clearance phase to earth	mm	100	32	20
Minimum creepage distance phase to earth over cable surface	mm	250	125	26
The minimum cable box clearances in air-filled, air-insulated boxes, live metal to live metal and unshrouded shall be as follows:-				
Nominal system voltage	kV	33	11	
Minimum clearance between phases	mm	356	178	
Minimum clearance phase to earth	mm	222	115	
Minimum creepage distance phase to earth over cable tail surface	mm	800	450	
The minimum cable box clearance in air-filled boxes with shrouded insulation termination is as follows:- When this type of termination is used the dimensions will be based on the termination manufacturers recommendations and be subject to approval by the Engineer.				

2.2.5 Minimum clearance from live metal to oil pipework (including conservator and pressure relief devices on transformers)

Highest system voltage	kV	36	12
Minimum clearance	mm	485	250
Apart from the clearances detailed under this item, no phase or earth clearances are specified for transformers where an impulse voltage test level is specified.			

2.2.6 Auxiliary power supplies

Supply voltage for auxiliary equipment	400 volt, 3 phase and Neutral 50 Hz 110 volts DC 2 wire
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2.3 Site conditions

2.3.1 General

The site conditions shall be assumed to be as follows for the purposes of Tender preparation.

2.3.2 Elevation

766 meters above sea level - Amman Airport at which all the climatic observations used were taken by the Jordanian Ministry of Transport Meteorological Department.

2.3.3 Earthquakes

Amman is classified as Seismic Zone 2.

2.3.4 Snow

Snowfall in cm at Locations in the Amman Area in 10 years 1972-1982.

Area	No of days of snowfall/year	Greatest depth of snow (cm)
Wadi Dhuleil	1-04	10
Amman Airport	1-13	30
Jordan University	1-13	60
Naur	1-13	45
Ma	1-04	25

2.3.5 Hail

Not a normal occurrence but occurs on average 3.2 days per year.

Station: Amman Airport	31 deg 59 min NORTH 35 deg 59 min EAST 766 m above sea
Period: 1923 - 1985	

2.3.6 Air temperature (Degrees Centigrade)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR- LY
Mean monthly	7.9	9.	11.7	15.9	20.5	23.6	25.1	25.4	23.5	20.4	14.9	9.8	17.3
Mean daily max	12.4	13.8	17.4	22.5	27.8	30.9	31.9	32.4	30.7	27.2	20.6	14.5	23.5
Mean daily min	3.5	4.2	6.1	9.3	13.3	16.3	18.2	18.3	16.2	13.6	9.3	5.1	11.1
Absolute max	26.3	29.4	32.5	39.2	40.6	42.8	42.4	42.8	40.6	37.4	.8	27.3	42.8
Absolute min	-7.5	-6.5	-3.9	0.0	3.0	7.8	11.0	11.5	8.9	4.9	-3.2	-5.3	-7.5
Design ambient temperature is 45 degrees centigrade													

2.3.7 Rainfall amount (millimeter)

Mean monthly	64.5	63.9	44.7	16.1	3.7	0.03	TR	TR	0.4	5.8	28.6	48.6	276.3
Max amount in a month	235.2	190.8	168.7	151.3	30.6	1.1	TR	TR	15.4	54.6	136.8	179.8	476.5
Max amount in one day	75.6	80.0	66.2	52.4	24.1	1.1	TR	TR	15.4	40.5	79.4	73.6	80.0

2.3.8 Relative humidity (%)

Mean monthly	70.0	67.0	60.0	50.0	39.0	37.0	40.0	43.0	47.0	46.0	56.0	68.0	52.0
Max relative humidity reaches 100 per cent especially during rainy intervals and night, while min relative humidity drops to less than 10 per cent on some occasions especially during Khamsinic conditions (22 March - 10 May).													

2.3.9 Mean wind speed (m/s)

Direction (deg)	227	241	251	254	275	276	278	282	284	267	226	222	264
Mean monthly	3.2	3.3	3.4	3.6	3.3	3.6	3.9	3.4	2.6	2.2	2.4	2.9	3.2
Max wind gust	35	28	30	31	24	22	19	17	17	26	26	34	.....

2.3.10 Clouds “oktas”

Mean amount	3.8	3.5	3.4	3.2	1.9	0.6	0.3	0.3	0.7	1.5	2.6	3.4	2.1
No cloudy days	4.7	3.1	3.8	2.5	0.7	0.0	0.0	0.0	0.0	0.3	1.0	3.6	19.5

2.3.11 Fog “visibility 1 km or less”

Mean no of days	1.5	0.7	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7	3.9
Max number of days with fog 11 days per year													

2.3.12 Dust “visibility 1 km or less”

Mean no of days	0.4	0.1	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.7
Max number of days with dust 6 days per year													

2.3.13 Thunderstorms

Mean no of days	0.4	0.4	1.3	0.8	0.6	0.0	0.0	0.0	0.4	1.2	1.1	0.4	6.6
Max number of days with thunder storms 17 days per year													

3. GENERAL TECHNICAL CLAUSES

3.1 Standards

Although American, British or IEC standards for workmanship, material and equipment have been selected in these Specifications as a basis of reference, standards and specifications of other countries and recommendations of other standard international organisations will be acceptable provided they are substantially equivalent to, or higher than, the designated standards and provided furthermore that the Supplier submits for approval details of the specifications he proposes to use.

When IEC recommendations or national standards are referred to the Edition shall be that current at the date of Tender, together with any amendments issued to that date.

If requested by the Engineer, the Contractor shall supply at his own expense three copies in English and one in the original language of any national standards which are applicable to the Contract.

3.2 Design and standardization

The Goods shall be designed to facilitate inspection, cleaning and repairs, and for operation in which continuity of service is the first consideration. All apparatus shall be designed to ensure satisfactory operation under the atmospheric conditions prevailing at the Sites and under such sudden variations of load and voltage as may be met with under working conditions on the system, and short circuits, including those due to faulty synchronising within the rating of the apparatus.

The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the Goods and of associated works supplied under other Contracts.

All material used shall be of the best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature and atmospheric conditions arising under working conditions without distortion or deterioration or the setting up of undue stresses in any part, and also without affecting the strength and suitability of the various parts for the work which they have to perform. No welding, filling or plugging of defective parts will be permitted without the sanction in writing of the Engineer.

Corresponding parts liable to renewal shall be interchangeable. When required by the Engineer, the Supplier shall demonstrate this quality.

All apparatus shall operate without undue vibration and with the least practicable amount of noise.

Cast iron shall not be used for chambers of oil-filled apparatus or for any part of the equipment which is in tension or subject to impact stresses except where it can be shown that service experience has been satisfactory with the grade of cast iron and the duty proposed.

Operating boxes, kiosks, cubicles and similar enclosed compartments forming part of auxiliary equipment shall be adequately ventilated to restrict condensation, and, where required by the Engineer, suitable low-temperature heaters shall be provided. All

contactor or relay coils and other parts shall be suitably protected against corrosion.

All outdoor apparatus, including bushing insulators and fittings shall be so designed as to avoid pockets in which water can collect.

The underside of all tanks shall be ventilated in an approved manner to prevent corrosion.

Accessible means shall be provided for the easy lubrication of all bearings and where necessary, of any mechanism or moving part. Grease lubricators shall be fitted with hexagon nipples.

All mechanisms shall, when necessary, be constructed of stainless steel, brass or gunmetal to prevent sticking due to rust or corrosion.

All taper pins used in any mechanism shall be of the split type.

The busbars, connections, isolators, fuses, contacts, cable boxes, trunking connections etc., which form part of the Contract Works shall not exceed the temperature rise values specified in the relevant IEC publication or equivalent national standard.

All connections and contacts shall be of ample section and surface for carrying continuously the specified currents without undue heating, and shall be secured by bolts or set screws of ample size, fitted with locking devices of approved type and material.

All rubbing or wearing surfaces shall be machine surfaced. Joints employing a gasket material shall be so constructed that the packing is maintained under sufficient compression in all parts, so that an efficient joint can be made without the use of jointing compounds. Gasket material shall be of the minimum thickness necessary and of approved composition.

All apparatus shall be designed to obviate the risk of accidental short circuit due to animals, birds, and vermin. Openings in ventilated enclosures shall be so constructed to prevent the entry of vermin and insects.

3.3 Galvanizing

Galvanizing shall be applied by the hot dipped process. The preparation for galvanizing and the galvanizing process shall not adversely affect the mechanical properties of the material being coated. The zinc coating shall be clean, of uniform thickness and free from defects.

When zinc spray coating is used, surfaces shall be shot blasted before spraying.

Drilling, punching, cutting, bending and removal of burrs shall be completed before galvanizing/zinc spray coating.

The average thickness of the zinc coating shall be equivalent to not less than 0.6 kg/m² of zinc for all surfaces, except steel wires.

The thickness of the zinc coating for steel wires shall be in accordance with a national standard and shall be approved by the Engineer.

Material on which galvanizing has been damaged shall be re-dipped unless, in the opinion

of the Engineer, the damage is local and can be repaired by applying a coat of galvanizing repair paint. Where such a repair is authorized, the damaged area shall be cleaned by wiping with clean rags saturated with mineral spirits or xylene followed by wire brushing. After wire brushing, the area shall be re-cleaned with solvent to remove residue and shall be given a minimum of two coats of zinc rich paint in accordance with the manufacturer's instructions.

Samples selected by the Engineer of all galvanized material shall be subjected to the galvanizing tests set out in the appropriate material standard (eg BS 443/BS 729).

Sheradizing or other similar processes shall not be used unless expressly approved by the Engineer.

Surfaces in contact with oil shall not be galvanized or cadmium plated.

3.4 Copper conductors

All copper conductors shall be composed of high conductivity electrolytic copper having a conductivity of not less than 99.9 per cent of the International Agreed Copper Standard (IACS).

3.5 Aluminium and aluminium alloys

Aluminium shall be of high commercial quality. The composition, including the percentage and nature of any impurities, shall be stated in the schedules.

All aluminium alloys shall be of approved compositions as stated in the schedules.

Aluminium and aluminium alloy castings shall be sound and free from porosity.

3.6 Labels and identification plates

All equipment shall be clearly and permanently labelled, to the approval of the Engineer, in English, unless otherwise specified. Where labels are provided in diagrammatic form, any inscription shall be in English unless otherwise specified.

A label shall be permanently fixed to each item of equipment in a clearly visible position stating:

**Property of The Jordanian Electric Power Co Ltd
Year of Manufacture**

All control and relay panels, marshalling boxes, kiosks, distribution boxes and other cubicles shall be labelled to show the circuit with which it is associated. These labels shall be fitted to the front and back of all equipment.

Labels, number plates and their fixing screws, for outdoor use, shall be of stainless steel or other corrosion resistant material. Where the use of vitreous enamelled labels is approved, the whole surface including the back and edges shall be properly covered and protection shall be provided front and back on the fixing screws.

The materials of the labels and number plates, for indoor and outdoor use, shall be approved by the Engineer and shall be fixed so as to prevent buckling due to temperature

and humidity variations.

Danger notices shall have red lettering on a white background and shall be in English and Arabic.

Unless otherwise approved by the Engineer, all other labels and number plates shall have black inscriptions on a white base colour.

Labels for similar equipment shall be of uniform appearance and the dimensions and size of letter shall be to the approval of the Engineer.

Each equipment shall be marked with its function, manufacturer's name or trade mark and the code type number together with the batch or serial number.

Each detachable unit shall be either marked so as to enable it to be identified with the parent equipment, or else marked with the manufacturer's name and type number or code number and where definable, its function.

Each Unit and sub-unit mounting position shall be marked to indicate the type of unit or sub-unit to be located in that position. Addmarkings may be required for apparently identical units or sub-units having different pre-set characteristics.

Component reference numbers shall be marked adjacent to the component. Where this is impossible, components shall be identifiable from the drawings provided by the Contractor.

The following shall be marked in all instances:-

- (a)** Fuse. The rating and circuit identification of each fuse shall be marked adjacent to the fuse base.
- (b)** Control and Indicating Devices. The function of each control and indication device shall be marked. The caption and its arrangement shall be subject to the approval of the Engineer.
- (c)** Pre-set Controls. The circuits reference and if possible, the function, shall be marked adjacent to each pre-set control in a position where it will be clearly visible while the adjustment is being made.
- (d)** Connectors. The diagram reference number shall be marked on, or adjacent to each connector.
- (e)** Test Points shall be individually marked with the diagram reference number.

All junction boxes shall include a record pasted inside the lid showing the terminal allocation.

Each terminal of a screw type terminal block shall bear the identification marking either on the body of the block, or adjacent to it. All other terminal blocks shall be marked with their circuit designations and rows shall be marked to identify each connection to the approval of the Engineer.

All wiring shall be identifiable by an approved colour code, ferrules marked with the

nomenclature adopted for these conductors, on the manufacturer's diagrams, or by circuit reference at the terminals.

3.7 Bolts and nuts

All bolts, studs, screw threads, pipe thread, bolt heads and nuts shall be of ISO metric standard type.

Except for small wiring, current carrying terminal bolts or studs, for mechanical , shall not be less than 6 mm in diameter.

All nuts and pins shall be adequately locked.

Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt will remain in position.

All bolts, nuts and washers placed in outdoor positions shall be treated to prevent corrosion of the threads and electrolytic action between dissimilar metals.

Where bolts are used on external horizontal surfaces where water can collect, methods of preventing the ingress of moisture to the threads shall be provided.

Each bolt or stud shall project at least one thread but not more than four threads through its nut, except when otherwise approved for terminal board studs or relay stems. If bolts and nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided.

The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members.

Taper washers shall be provided where necessary.

3.8 Cleaning and painting

Before painting or filling with oil, gas or compound, all ungalvanized parts shall be thoroughly cleaned, free from rust, scale, burrs, grease and moisture and all external rough surfaces on casting shall be filled.

The following minimum painting requirements shall apply to all ferrous parts unless the supplier can show, to the satisfaction of the Engineer, that any alternative he proposes is in all respects equal or superior to the specified requirements:

3.8.1 External surfaces at works

<p>All ungalvanized surfaces, other than nuts, bolts and washers, which may be removed for maintenance purposes, for use outdoors</p>	<p>One priming coat of corrosion inhibiting paint applied immediately after cleaning</p> <p>Two coats of non-glossy, oil- and weather-resisting paint applied after inspection and testing and before despatch</p> <p>One finishing coat of glossy oil and water resisting non-fading paint before despatch.</p>
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Exposed, ungalvanized nuts, bolts and washers which may be removed for maintenance purposes, for use outdoors	One coat of oil - and weather-resisting, non-fading paint applied.
Panels, cubicles, kiosks and apparatus boxes, for use indoors	Three coats of paint, the colour and finish of the final coat to be to the approval of the Engineer. Grey colour is preferable.

3.8.2 Internal surfaces

Apparatus	Painting
Oil filled chambers and tanks	One coat of oil resisting varnish or paint
Kiosks and apparatus boxes for use outdoors	Three coats of paint, the final coat being an anti-condensation finish coloured white or light grey
Cubicles, kiosks and apparatus boxes for use indoors	Three coats of paint, the final coat being a white or light colour.

Successive coats of paint shall be easily distinguishable by shade of colour and shall be applied to a clean, dry and properly prepared surface. Each coat shall be compatible with the previous coat.

All paintwork which has been damaged during transport or erection shall be made good to the approval of the Engineer.

The colour and shade of all painted external surfaces shall be to the approval of the Engineer.

3.9 Insulating oil and gas

Unless otherwise specified, sufficient oil or gas shall be supplied to fill all equipment provided under this Contract. The oil or gas shall be of appropriate type and suitable in all respects for use in the equipment when it is operated under the conditions laid down in this Specification. The insulating medium used shall comply with the relevant IEC Specification.

3.10 Prevention of acidity

The design, and all materials and process used in construction of the equipment, shall be such as to reduce to a minimum the risk of development of acidity in the oil or gas.

3.11 Fire precautions

All apparatus, connections and cabling shall be designed and arranged to minimize the risk of fire and any damage which might be caused in the event of fire.

3.12 Corona and radio interference

All equipment shall be designed so as to minimize corona or other electrical discharge and radio interference.

3.13 Locking devices and padlocks

All padlocks, locks and keys required to secure switchgear and other equipment shall be supplied on this Contract.

Access doors to equipment including circuit breakers, isolating devices, screened enclosures, cubicles and marshalling kiosks and all equipment operating handles, local control and selector switches, valves, switchgear shutters and maintenance positions shall be lockable.

All padlocks and other locks shall be provided with two identical keys and both the key and the lock shall be impressed with the manufacturer's serial number. Except where a master key is specially requested or it has been otherwise agreed, it shall be impossible to open any padlock or lock with the key of any other padlock or lock provided on this Contract.

When requested, wall mounting lockable cabinets with glazed doors, suitable for accommodation of padlocks and keys whilst not in use, shall be provided. They shall be mounted in approved positions and shall be labelled in a similar manner to the keys. The engraving on all labels shall be in accordance with a scheme to be agreed with the Engineer.

3.14 Tools

The Supplier shall provide any special tools that may be required for making adjustments to equipment during normal operation and maintenance. These tools are to be of alloy steel and shall be contained in steel boxes, complete with locks and keys.

All tools shall be stamped in an approved manner for identification purposes.

3.15 Erection marks

All plant that requires assembly at Site shall have distinguishing marks on it to facilitate erection and to identify the material in relation to drawings, material lists or shipping documents. All marks shall be legible and easily visible. Where relevant, erection marks shall be stamped before galvanizing and shall be clearly visible after galvanizing.

3.16 Operating and maintenance instructions

Operating and maintenance instructions form part of this Contract and shall be provided in accordance with the Conditions of Contract.

3.17 Spare parts

Particulars of spare parts, which may or may not form part of the Contract at the Engineer's discretion, shall be given in Schedule J.

3.18 Manufacturing experience and qualifications

The Tenderer shall provide documentary evidence confirming that equipment of an identical design and rating to that offered against this document has been in production for a minimum of 10 years. In addition a list is to be provided with full address and telex number of users with service experience of equipment identical to that offered.

3.19 Quality Assurance system

The supplier must hold ISO 9002 (alternatively ISO 9001) certification of their quality

assurance procedures. Evidence of such certification must be submitted with the Tender.

Where an equivalent certification to ISO 9002 (alternative ISO 9001) is offered, details of the system, the certification body and the frequency and type of audits, both internal and external, shall be submitted with the Tender. The equivalent certification shall be subject to review, evaluation and approval by JEPCO or its appointed representative(s).

4. 33 AND 11 KV OVERHEAD LINE FAULT INDICATORS

4.1 APPLICATION

This specification covers the general requirements of design, manufacture and testing of clip-on fault indicator for locating phase-to-phase and phase-to-earth faults on 33 & 11 kV overhead line distribution system.

4.2 SERVICE CONDITIONS

The fault indicator shall be designed to operate in the following conditions:

Symmetrical Fault Current	18 kA/1s (maximum phase current that the fault indicator shall withstand)
Shocks & vibrations	120 minutes of sine vibrations and 2000 negative and 2000 positive shocks, in OX, OY and OZ axes
EMC and EMI	must have passed IEC and FCC approval
Lightning surge	125kV shocks
Maximum Ambient Temperature	85° C
Maximum annual average temperature	30° C
Humidity	At least 95% during at least 2 24 hours cycles with temperature up to +55°C according to IEC 68 2 30
Environmental conditions	According to clause No. 2.3: Site Conditions

4.3 APPLICABLE STANDARDS

Electro-magnetic compatibility	IEC 61000-6-2 and FCC part 15
IP54 protection level	IEC 60529
Damp Heat cycle Test (humidity and heat cycles)	IEC 68-2-30
Salty fog	IEC 68-2-11
Sinus wave vibrations & chocks	IEC 68-2-6, IEC 68-2-29
Dielectric test	IEC 60060-1
Temperature aging	IEC 68-2-14
short circuit	ANSI 495 (part 4.4.8)

4.4 BASIC FEATURES

4.4.1 General

- a) The fault indicator shall be suitable for outdoor use in the climate condition stipulated in clause 2.3 above.
- b) The components used in the fault indicator shall be suitably protected from direct sunlight to prevent malfunctioning due to solar radiation. The maximum operating temperature shall not be less than 85° C.
- c) The fault indicator shall be suitable for mounting on either copper or aluminium line

conductors of a diameter ranging between 5 and 25 mm. It shall be fully self-contained type without any external connection, indicator or sensors.

- d) The fault sensing shall be based on detection of the electromagnetic field and its variations.
- e) The fault indicator shall be suitable for use on multiple lines supported by the same pole.
- f) The fault indicator shall be of the programmable type, suitable for sensing:
 - 1. Short-circuit faults up to 18 kA for 1s.
 - 2. Low earth leakage faults (referred to as “unbalance”) down to 10A.
- g) The fault indicator shall detect faults based on 2 simultaneous tripping criterias:
 - 1. In order to detect strong fault currents (typically phase-to-phase faults), it shall trip when the phase current exceeds absolute threshold for a fixed duration of about 20 ms. This absolute threshold must be configurable to at least 4 different values between 100 and 800A.
 - 2. In order to detect low fault currents (typically resistant phase-to-earth faults), it shall trip when it detects the phase current increase within a fixed duration (about 20ms) exceeds a relative threshold. This threshold must be configurable to at least 6 different values between 6 and 160A.

It shall be possible to disable this second tripping criteria.

- h) When a fault occurs on the network, the upstream protection will trip within 70s maximum (inverse time protection). Therefore, in order to prevent tripping due to a load increase, on detection of one of the above criterias, the fault indicator shall confirm the fault by checking if the voltage disappears within the next 70s. and start to indicate the fault only under this condition.
- i) In case of faults, the fault indicator which are detecting the variation of the electromagnetic field due to fault current (fault indicators installed between the circuit breaker and fault point) shall provide a light indication, while fault indicators downstream the fault or on non-faulty branches shall not show any indication.
- j) The fault indication shall be provided by the means of a flashing light system offering a good contrast against sunshine (red color is mandatory) and an MTBF of the light emitting system at least 45 000 Hours (LEDs for instance). It shall provide a light of an intensity of 40 Lumen minimum and give a 360° visibility from at least 50m in sunny day conditions, and at least 1000m at night.
- k) The fault indicator is primarily intended to allow localization of permanent faults. For this purpose, when the line remains out of power following the fault, the fault indicator shall flash at a frequency of once per 3s and shall remain flashing:
 - 1. Until the time-out has expired (this time-out must be configurable to at least 4 possible values between 2 and 16 hours),
 - 2. Until the medium voltage is back,
 - 3. Until the fault indicator is reset manually,Whatever condition comes first.

Caution: since the load current might be very low upon MV return, load current reset FIs are not acceptable.

- l) The fault indicator shall also provide some means to localize non permanent faults (i.e. faults for which the protection device trips but then disappear before the end of reclosing cycles therefore allowing a successful reclosing). Such faults shall be shown in a different way than for permanent faults (for instance, slower flashing frequency is allowed), for the configured time duration mentioned above, and with the same flash power (40 lumen minimum) as for permanent faults.

Caution: fault indicator using a less powerful flash to indicate transient faults are not acceptable

- m) The fault indicator shall include some self-test possibility usable when the fault indicator is on the line (powered or not).
- n) The fault indicator shall be selective in action as indicated below:
 - 1. It shall not respond to any sudden variation (increases/decrease) in load current.

2. It shall not respond to an overcurrent not due to a fault.
3. It shall not respond to high magnetizing inrush currents, created upon line energizing.

4.4.2 Equipment Housing

The fault indicator housing shall be made of high strength plastic and shall be of UV stabilized and flame retarding type.

4.4.3 Clip-on clamps

The fault indicator shall clip on the conductor once its opened spring clamps are pushed onto it. The strength of the clamps once closed must be sufficient for the fault indicator to withstand winds of 150 km/h without falling from the line.

4.4.4 Installation

Installation shall be possible on live lines using (8-12) meters and isolated hot stick with shot gun type termination.

4.4.5 Power supply

The power supply for the operation of the equipment shall be from a lithium battery suitable for at least 10 years trouble-free service. It shall be easily replaceable. The user must be able to find the battery on the market. Only adaptation of a wire and connector to a standard battery can be accepted.

Caution: fault indicator with specially designed battery are not accepted

4.5 QUALITY ASSURANCE

The Bidder shall supply documentary proof that the manufacturer possesses ISO 9001 and ISO 14001 Quality assurance certification, from an independent internationally recognized body, for the design, manufacture and testing of Clip-On Fault Indicator for medium voltage lines.

4.6 Rating Plates or Labeling

Each fault indicator shall carry a weather and corrosion proof Rating Plate indicating the following particulars.

- a) Manufacturer's identification.
- b) Model or type number (as per catalogue)
- c) Year of manufacture in characters big enough to allow reading from the ground so that to provide indication of battery age.

5. INSPECTION AND TESTS

5.1 General

All equipment is subject to inspection by the Engineer at the Manufacturer's Works. Not less than fourteen days notice of all tests shall be given to the Engineer in order that he may present if he so desires. The Supplier shall make the tests specified and any others required by the Engineer to show that the Goods comply with the Specification and with the appropriate Schedules. The tests shall be made at the Supplier's expense.

No passing of the plant or materials by the Engineer shall relieve the Supplier of his responsibility. The Supplier shall also be responsible for proper carrying out of all tests of work and of plant and material carried out or supplied by a Sub-contractor to the same extent as if the work, plant or material were carried out or supplied by the Supplier himself.

If, due to the Goods and/or component materials not complying with this Specification further tests is necessary, the Supplier shall pay all additional costs which may be incurred in re-testing.

During the execution of the Contract, test specimens, if required by the Engineers, shall be taken from the materials for the purpose of check tests or analyses for testing and forwarded at the expense of the supplier to the Testing Authorities selected by the Engineer.

Three copies of the Supplier's records of all tests shall be given to the Engineer.

All material which is specified for tests at the Manufacturer's Works shall satisfactorily pass such test before being painted.

All instruments used for the purpose of testing shall be approved and, if required, shall be calibrated at the expense of the Supplier by such body as may be approved.

Where type tests are specified below they shall be carried out in the presence of the Engineer. Alternatively the Supplier shall provide certificates showing that such tests have been carried out satisfactorily on apparatus similar to that being supplied.

5.2 Type test reports

The manufacturer must be able to deliver test reports from independent laboratories, to confirm that his equipment passed the requested tests.

SCHEDULE A
ITEMS OF THE CONTRACT FOR THE PURPOSES OF
PAYMENT AND TAKING OVER

Item No.	* Description	Quantity
1.A	33&11 kV Overhead Line Fault Indicators	500 Each
1.B	33&11 kV Overhead Line Fault Indicators with the possibility to communicate with SCADA system.	
2.	Hot Insulation stick for Fault Indicator Installation (adjustable length (8-12) m working height)	6

Notes:

- JEPCO has the right to award either option 1.A or 1.B or a combination of them.
- The Tenderer shall submit his offer in two forms; one hard copy and one soft copy on "CD" as a pdf file in a closed envelope. Both copies shall be exactly identical and shall include complete documentation necessary for evaluation such as technical and commercial information, schedules and drawings.
- Three non-returnable samples shall be submitted with the offer for evaluation purposes. Failure to submit the samples will entitle jepco to consider the offer non-responsive.
- Documents to be submitted as an integral part of the offer, and to be evaluated with the tender:
 1. Full technical details, drawings and catalogues of the items required herein.
 2. Test reports from independent laboratories to confirm that the equipment passed the requested tests.
 3. Fully detailed reference list with contact details.
 4. ISO certificate and any other documents that may assist in the evaluation.
- The above items shall be provided with a bar code of 128 type C that represents the primary and secondary number of these items, as shown in the table below:

Item No.	Item Code
1.	07712202

SCHEDULE B
TIME PERIODS FOR PROCUREMENT, DESIGN, MANUFACTURE,
INSPECTION, TESTING, COMAND DELIVERY

(TO BE COMPLETED BY THE TENDERER)

Note 1 All time periods are weeks from date of Contract Placement.

Note 2 For purposes of Tender Evaluation, the time from commencement date within which the material is required to be delivered to the Port of Aqaba shall be 12 weeks.

Description	Item 1 weeks	Item 2 weeks
Time within which all arrangement and equipment drawings shall be submitted for approval.
Time within which all material shall be available for final inspection and testing in works.
Time within which the plant shall be packed and delivered to the Docks (FOB).
Time within which the plant shall be packed and delivered to Aqaba Port.

SCHEDULE C
MANUFACTURERS AND PLACES OF MANUFACTURE,
TESTING AND INSPECTION

(TO BE COMPLETED BY THE TENDERER)

Item No.	Description	Manufacturer	Place of Manufacturer	Place of Testing & Inspection*
1.A	33&11 kV Overhead Line Fault Indicators	.....	.....	.....
1.B	33&11 kV Overhead Line Fault Indicators with the possibility to communicate with SCADA system.	.....	.....	.....
2.	Hot Insulation stick for Fault Indicator Installation (adjustable length for (8-12) m working height)	.....	.....	.....

* Materials and apparatus shall be tested at the Maker's Works in accordance with the appropriate National/International Specifications or equivalent specifications which may be applicable.

FAULT INDICATORS)

No.	Description		Item 1 11&33 kV
1	Type. Max Symmetrical Fault Current for 1 Sec	KA	----- -----
2	Max Symmetrical Fault Current for 3 Sec	KA	-----
3	Lightning surge	KV	-----
4	Maximum Ambient Temperature	° C	-----
5	Maximum annual average temperature	° C	-----
6	Maximum Conductor Diameter the Fault Indicator can be mounted on	mm	-----
7	Minimum Conductor Diameter the Fault Indicator can be mounted on	mm	-----
8	Fault Sensing Criteria		-----
9	Can be used on multiple line supported by same pole?	Yes/No	-----
10	The fault indicator can be programmable suitable for sensing Short-circuit faults up to 18 kA for 1s.	Yes/No	-----
11	Short-circuit faults range	KA	-----
12	The fault indicator can be programmable suitable for sensing Low earth leakage faults (referred to as “unbalance”) down to 10A	Yes/No	-----
13	Low earth leakage faults	A	-----
14	How can the fault indicator confirm the fault?		-----

SCHEDULE D–CONTINUED

TECHNICAL DATA

(33 & 11 KV FAULT INDICATORS)

No.	Description	Item 1 11&33 kV
15	Flashing Light System : 1. Color 2. MTBF of the Light Emitting System 3. Light Intensity i. Max. Visibility Distance In Sunny Day Conditions ii. Max. Visibility Distance In Night Conditions. Flash Frequency 4. Does the Flash remain until : a. The time-out has expired b. Until the medium voltage is back c. Until the fault indicator is reset manually	----- ----- Hours Lumen ----- m ----- m ----- once per sec. ----- Yes/No ----- Yes/No ----- Yes/No -----
16	Ability localize non permanent faults and distinguish its flashing ?	Yes/No -----
17	Is Fault Indicator Include some self-test possibility usable when the fault indicator is on the line (powered or not)?	Yes/No -----
18	Is Fault Indicator protected against UV stabilized and flame retarding type Housing?	Yes/No -----
19	Is Fault Indicator Clip-on clamps type or not?	Yes/No -----
20	Can be installed on live lines using an isolated hot stick?	Yes/No -----
21	Type of Power supply	-----
22	Life of Power supply battery Is it replaceable or soldered?	Years ----- -----
23	Life time of Fault Indicator	Years -----
24	Communicatin createrion with SCADA	-----

SCHEDULE D – CONTINUED
TECHNICAL DATA
(HOTSTICK FOR FAULT INDICATOR INSULATION)

No.	Description	Item 2
1.	Hot Stick Length (Working Height) m	-----
2.	Telescopic or not ? Yes/No	-----
3.	Insulation Level KV	-----
2.4	Overall length extended. mm	-----
2.5	Overall length folded. mm	-----
4.	Hot Stick Material	-----
5.	Hot Stick Weight Kg	-----

SCHEDULE E
DRAWINGS AND MAINTENANCE INSTRUCTIONS

All drawings shall be to scale and fully detailed. All important dimensions shall be given and the material of which each part is to be constructed shall be indicated.

Drawings for approval shall be submitted in duplicate as paper prints and, after having approved, the Supplier shall supply any further copies required by the Engineer, one copy at least being a reproduction tracing cloth or approved plastic film.

SCHEDULE F STANDARDS

The Tenderer shall list the standard specifications to which the main items of tendered equipment are designed and manufactured.

Equipment	National Standard	English Title

SCHEDULE G1
LIST OF EQUIPMENT WITH PRICES

To complete each equipment details in this schedule there shall be provided the necessary oil (synthetic liquid), cable boxes, all auxiliary apparatus, including any steelwork, panel wiring, fuses, interlocking gear, holding down bolts, screens, guards, labels, cable sockets, connectors and all necessary sundries whether specified in detail or not.

The items of equipment comprise:-

Item No.	* Description	Quantity
1.A	33&11 kV Overhead Line Fault Indicators	500 Each
1.B	33&11 kV Overhead Line Fault Indicators with the possibility to communicate with SCADA system.	
2.	Hot Insulation stick for Fault Indicator Installation (adjustable length (8-12) m working height)	6

SCHEDULE G2 – CONTINUED
QUANTITIES WITH PRICES - CONTINUED

Item 1.A

Description	:	11&33 kV Overhead Line Fault Indicators	
Quantity	:	500 Each	(1)
Firm unit FOB price	:	-----	(2)
CURRENCY	:	-----	
Firm freight charges to Port of Entry - Aqaba	:	-----	(3)
Unit firm C&F price to Port of Entry - Aqaba	:	-----	(4) = (2) + (3)
Total firm C&F price to Port of Entry - Aqaba	:	-----	(5) = (1) × (4)

Item 1.B

Description	:	33&11 kV Overhead Line Fault Indicators with the possibility to communicate with SCADA system.	
Quantity	:	500 Each	(1)
Firm unit FOB price	:	-----	(2)
CURRENCY	:	-----	
Firm freight charges to Port of Entry - Aqaba	:	-----	(3)
Unit firm C&F price to Port of Entry - Aqaba	:	-----	(4) = (2) + (3)
Total firm C&F price to Port of Entry - Aqaba	:	-----	(5) = (1) × (4)

Item 2

Description	:	Hotstick for Fault Indicator Instalation (adjustable length for (8-12) m working height)	
Quantity	:	6 Each	(1)
Firm unit FOB price	:	-----	(2)
CURRENCY	:	-----	
Firm freight charges to Port of Entry - Aqaba	:	-----	(3)
Unit firm C&F price to Port of Entry - Aqaba	:	-----	(4) = (2) + (3)
Total firm C&F price to Port of Entry - Aqaba	:	-----	(5) = (1) × (4)

SCHEDULE H
SUMMARY OF TOTAL FIRM PRICES

Items for the purpose of payment and taking over	Total firm FOB price	Total firm CFR price	Total firm CFR price
33&11 kV Overhead Line Fault Indicators
33&11 kV Overhead Line Fault Indicators with the possibility to communicate with SCADA system.
Hotstick for Fault Indicator Instalation (adjustable length for at least 12 m working height)
Spare parts etc.from Schedule 'J'**
TOTAL FIRM FOB CONTRACT PRICE			
TOTAL FIRM C&F CONTRACT PRICE			

** Not to be included in the Form of Tender since it is at the option of the Purchaser.

SCHEDULE J
RECOMMENDED SPARES FOR OVERHEAD LINE EQUIPMENT

Prices, quantities and descriptions of spare parts and maintenance equipment recommended by the Tenderer for the requirements of the surge arresters in Schedule 'G' and 'H' acceptance of

Description of spares recommended	No. required (1)	Unit firm C&F price (2)	Total firm C&F (1)×(2) (3)
GRAND TOTAL FIRM C&F CONTRACT PRICE OF SPARES *			

which shall be at the option of the Employer.

* NOTE: To be included in Schedule H

SCHEDULE K
DEVIATIONS FROM SPECIFICATION

It will be assumed that the plan offered will conform to the Specification in all respects unless deviations are mentioned in this Schedule.

The Purchaser may waive any minor informality, non-conformity or irregularity in an offer that does not constitute a material deviation provided such waiver does not prejudice or affect the ranking of any Tenderer. Major deviations in the opinion of the Engineer will render the bid non-responsive.

SCHEDULE L

LIST OF SPECIAL TOOLS AND EQUIPMENT REQUIRED FOR MAINTENANCE PURPOSES

List of Special Tools and Equipment to be provided by the Contractor for maintenance purposes and included in the bid price.

SCHEDULE N

TRANSPORT FACILITIES

General

It shall be the responsibility of the Contractor to arrange for the shipment of all equipment from the country of origin to the Port of Entry in the Hashemite Kingdom of Jordan.

Seafreight

When equipment is shipped by sea it must be consigned to the Port of Aqaba.

Transfer of equipment from ship to shore is normally done by mobile crane or ships derricks, otherwise by lighters which have a maximum capacity of 500 tonnes. Unloading from the lighter to the quay is limited to a maximum lift of 10 tonnes by means of a mobile crane.

Roll-on and roll-off facilities are also available for containerized goods. Containerized goods may be consigned to Amman for customs clearance.

For special heavy loads a 'Z' craft is available in the harbour onto which a heavy trailer can be manoeuvred from a special base constructed for this purpose.

Trailers with a loading capacity of up to 40 tonnes are available in Jordan and therefore the limit of weight which can be handled depends entirely on the capacity of the ships derricks.

Transport from the Port normally is on 340 km of rough road although there is a rail head at Ma'an (100 km north of Aqaba). The rail gauge is 1050 mm and the rail company possesses eighteen "flats" each with a maximum capacity of 15 tonnes.

Airfreight

When airfreight of equipment is authorized it must be consigned to Queen Alia International Airport, Amman.

Any goods to be shipped by air may be made by eligible airlines in accordance with Clause 1.4 of Instructions to Bidders. The Jordanian International Airport is Amman's Queen Alia International Airport (QAIA). The Royal Jordanian airlines have direct services to this airport.