

ANNEXURE – ‘D-1’

**TECHNICAL SPECIFICATION FOR H.V. CABLE FAULT LOCATING EQUIPMENT
(Amended 2017)**

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Technical Specifications of H.V. Cable Fault Locating Equipment

1.00 TECHNICAL SPECIFICATION:

- 1) The equipment shall be capable to test under ground power cables of 11KV,22KV,and 33KV rating.

It shall comprise of -

- (a) H.V. Thumper
 - (b) Computer aided digital cable fault pre-locator
 - (c) Arc reflection filter unit.
 - (d) D.C. H.V. Tester
 - (e) Fault pin-pointing set
 - (f) Cable route tracer.
 - (g) Cable identification instrument.
- 2) The Cable fault locating system shall be versatile, capable supportive to locate faults in a wide variety of power distribution cable networks. The unit shall be complete in all respect with all the necessary items, accessories and test technique and shall be ideal to ensure its maximum performance to detect faults or conditions for short, medium or long under ground distribution cable networks.

Technical Particulars :

- 1) **H.V. Thumper /Surge Generator :** -

The Surge Generator should be suitable for pinpoint location of cable faults up to 33kV.

The Details shall be as follows.

Sr. No.	Particulars	Technical Specification
1.	Rated Output	8-16-32 kV continuously variable at each range.
2.	Out Put Capacity	Minimum 2000 Joules at each step
3.	Impulse Sequence	Adjustable 3-10 sec. and single shot.
4.	Input Voltage	Single Phase , 230 V +/-10 % @ 50 Hz.
5.	Metering	for Output Voltage.
6.	Safety Features	Thermal Trip, Zero Interlocks, Tripping fuses for HV/LV controls, Auto safe discharge of surge capacitor after switch off & in the event of drop in mains voltage.
7.	Indications	HV ON, mains ON

8.	Other Accessories	1) HV cable of 40KV class of insulation min.50 meters long with suitable connecting clamps. 2) Earthing cables of min.50 meters long with suitable connecting clamps. 3) Mains cables of min.50 meters long All Cables shall be supplied on rewindable cable drums mounted on trolley.
9.	Size & weight	Weight should not be more than 125kg.
10.	Operating Temperature	-10°C to +50°C

2) **Computer aided digital cable fault pre-locator:**

The equipment shall be suitable for prelocation of cable faults in all types of underground cables up to 33 KV.

Technical Particulars :-

Prelocation of the faults must be available by all the following methods-

Modes of operation:

- i) Pulse Reflection Method
- ii) Impulse Current Method
- iii) Arc Reflection Method
- iv) Decay Method

The Details Technical specification as follows;

Sr. No.	Particulars	Technical specification
i)	Mode of Operation	Pulse Reflection, Impulse Current Method, Arc Reflection Method, Decay Method, Burn mode (20kv, 0.1amp)
ii)	Measuring Range	0 to 50 Km. in various steps.
iii)	Resolution	0.1 meters (at V/2H80 m/Isec.)
iv)	Pulse Width	40 ns10 µsec
v)	Fault Measuring Accuracy	0.2% of measuring range.
vi)	Velocity of propagation	10 to 150 m/µsec.
vii)	Display	Colour 10.4" full VGA display
viii)	Sampling Rate	1MHz to 200 MHz
ix)	Memory	Shall have capacity to store minimum 50 memories required.
x)	Power Supply	Shall work on single phase 230 V AC, 50 Hz, supply as well as on internal Rechargeable Battery of 12 V.
xi)	Weight & size	It should be light in weight & compact in size(not more than 10kg).
xii)	Interface	RS 232 via serial port, parallel port.

The instrument must have minimum of 50 memories and must have capability of Differential mode measurement for all the above-mentioned methods.

The gain and zoom factor of the curves obtained should be adjustable and the sampling frequency should be 100 MHz with pulse width ranging from 40 ns to 10 μ s depending on various cable lengths. It should have RS 232 output for connection to PC or printer.

The accuracy of the equipment should be $\pm 0.2\%$ of range. All necessary units required using the equipment in the above modes such as Arc reflection filter and CT and couplers should be included in the scope of supply.

3) **Arc reflection filter unit:**

The unit to be used to prelocate the high resistance, intermittent and flashing faults in conjunction with digital fault prelocator HV surge generator in Arc reflection method, automatic discharge to be incorporated for discharging the HV leads in case of power breakdown or an interruption.

4) **D.C. H.V. Tester:**

H.V. test instrument for testing of dielectric strength and insulation of the cable and cable installation.

Sr. No.	Particulars	Technical specification
1)	Test Voltage	0- 50 KV (D.C.)
2)	Test range	0-20 KV, 0-50 KV (Auto selectable)
3)	I max.	25 mA
4)	Input Power	230 V,50Hz, A.C.
5)	Metering	Analogue/ Digital metering of current and voltage in form of Bargraph & numeric values.
6)	Protection	Output current, overload relay, zero interlock, HV, auxiliary earthing to substation should be provided.
7)	Safety Features	Thermal protection, overload protection with auto discharge facility, zero interlock.

Insulation Tester, surge generator, Prelocator, Arc Reflection unit & HV tester etc shall be integrated as one unit to form a complete cable fault locating system and this system shall be mounted on a suitable trolley. The unit shall be provided with burning facility of 20kv at 0.1 Amp

5) **Cable Fault pinpointing set :**

The bidder shall supply a portable, battery operated instrument consisting of a receiver and combined sensor which will measure electromagnetic and acoustic signals. The instrument shall pin point the location of faults when used with the surge generator. The strength of the magnetic field provided by the generator shall be indicated on a clear digital display.

The measurement of acoustic noise shall be optimised through a switch-able filter which has a bandwidth designed to minimize ambient noise i.e. Vehicles, wind, etc. The pin-point equipment should work in TAR road, Cement concrete roads, and the ground microphone supplied should be wind protected.

Coincidence measurement shall be possible by receiving and displaying both sensors simultaneously. The instrument shall also indicate the distance between the sensor and fault based on the time taken by the travelling signals.

Technical specification for pinpointing set:

Sr. No.	Particulars	Technical specification
1)	Display	3 digit 7 segment LCD Display with backlight- separate channel for Acoustic & Magnetic, overflow display for distance value >100 msec.
2)	Broad band frequency range	Magnetic/ Acoustic -100Hz to 1.5KHz(W/O filter) Magnetic/ Acoustic-100Hz to 1.5KHz (with filter)
3)	Amplification Gain	Acoustic - > 110 dB Magnetic - > 110 dB
4)	Impedance for Ground microphone & Headphone	500 Ω
5)	Weight & size	It should be light in weight & of small size so that the operator can walk easily & concentrate on the fault easily.(not more than 3.5kg)
6)	Power supply	10 x 1.5 V. batteries AA or AAA or 6F22 size.
7)	Accessories	1) Ground Microphone suitable for pinpointing & sensing the acoustic as well as magnetic signals in concrete road, tar road, rocky & sandy soil. It Should be wind protected 2) Special Head Phone suitable for

		hearing & listening the lowest possible acoustic signal.
8)	Ingress Protection Class	Shall be minimum IP – 55

- 1) It should have an auto ranging facility with a digital readout of relative distance to the fault
- 2) It should have Bar graph-indication of the magnetic field strength for locating the cable path.
- 3) It should have Indication of battery condition.

6) **Cable Route Tracer**

The audio frequency cable route tracer should be ideal for locating the route of underground cable as well as for pinpointing the short circuit cable faults.

a) **Audio Frequency Generator**

Technical Specification:

- 1) LF output power: 0-200 Watt with selectable suitable ranges
- 2) O/p frequencies: Three Frequencies to be specified by the supplier.
- 3) Distortion factor at resistive load and matching:
Automatic/manual
- 4) Output Adjustment: From 0.5 ohm to 1000 ohm.
- 5) Permitted load resistance: Any short circuit, open circuit, continuous but with reactive loads etc.
- 6) Power Supply: Unit should be capable on mains AC supply, 230 V, 50Hz

b) **Audio Frequency Receiver**

The audio frequency receiver set should be battery operated and suitable to above frequencies. The receiver should be connected directly to the search coil. The coil can be rotated to 0-45 Degree or 90 Degree span in position for added versatility. It should have set forth high impedance and should provide maximum attenuation to external noise.

7) **Cable identification instrument :**

To identify the particular cable from the bunch of cable the cable identification set shall consist of following equipments,

a) **Transmitter :**

- output current : min 50 Amp
- output voltage –55 V(Harmless)
- Power supply: A.C. 230 V, 50 Hz. & Battery Operated.
- Protection class – IP-54

b) **Receiver :**

- Sensitivity : Min 4 stages continuously variable
- Indication : Center zero moving coil analogue meter indicator. (LCD or LED)
- Power supply: 9 V D.C. battery.
- Protection class – IP-54

c) **Identification tong:** Special type flexible tong suitable for 300 sq.mm cable.

8) **Cable Drums:-**

The unit shall be supplied with 50 meters cable each required for –

1. H.T. Cable
2. Grounding Cable.
3. Power Supply Cable.

9) **Trolley :-**

The surge generator, digital cable fault pre locator, D.C. testing set up, arc reflection filters and cable drums forming a compact portable fault locating system shall be mounted on suitable trolley with all the safety features.

2.00 TYPE TEST :

2.01 The tenderer shall furnish detailed type test reports of the Offered instrument for all the test as per relevant standards. All the above type testes shall be carried out at laboratories which are accredited by the National Board of Accreditation of Laboratories (NABL) of Government of India to prove that the instruments offered meet the requirements of specification. However, the tenderers who have supplied the offered instrument to MSEDCL against order from Central Purchase Agency of MSEDCL shall be exempted from submission of type test reports against this tender provided that.

- i. Their offered instruments are already fully type tested at Laboratories accredited by the National Accreditation Board for testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender.
- ii. There is no change in the design of type tested instruments and those offered against this tender.
- iii. Such tenderers complying (i) & (ii) above, shall furnish an undertaking in the format schedule 'F' enclosed herewith.

2.02 The Purchaser reserves the right to demand repetition of some or all the type tests in presence of purchaser's representative at purchaser's cost. For this purpose, the tenderer shall quote unit rates for carrying out each type test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in type test, the complete supply shall be rejected.

The Successful tenderer shall take approval / waiver of type test from C.E(Stores), MSEDCL, Prakashgad, Bandra, Mumbai Prior to commencement of supply.

In other cases where Indian/International Standards for the equipment is not available/specified, following test condition shall be made applicable against type test.

'The tenderer shall furnish detailed Calibration report of the offered instrument carried out at standard NABL approved Laboratories on at least one of the equipment as per relevant standards to prove that the instrument offered meet the requirements of specification.

Tenderer shall take approval/waival of calibration reports from C.E.(MMC),prior to commencement of the supply.

3.00 PRE DESPATCH INSPECTION:

The inspection shall be carried out at all the place of manufacturer unless otherwise. agreed upon by the manufacturer and purchaser at the time of purchases. For imported equipments the supplier/tenderer shall offer the equipment at the authorized service centre /works of the original manufacturer in India or at the supplier's works/Testing centre. The manufacturer shall offer to the inspector representing the purchaser all the reasonable facilities, free of charge, for inspection and testing to satisfy him that the material is being supplied in accordance with this specification.

The joint inspection of the equipment will be carried out by inspection wing & the appointed Executive Engineer testing division.

4.00 GUARANTEE :

The instrument shall be guaranteed for the period of five years from the date of commissioning or five and half years from the date of Dispatch whichever is earlier.The Instrument found defective within the above guarantee period shall be replaced / repaired by the supplier free of cost within one month of the receipt of intimation, If the defective instruments are not replaced/repaired within the specified period above, the MSEDCL shall recover an equivalent amount plus 10 % supervision charges from any of the bills of the supplier.

5.00 PACKING:

5.01The instrument shall be suitably packed in order to avoid damage or disturbance during transit or handling. Each instrument may be suitably packed in the first instance to prevent ingress of moisture and dust and then placed in a cushioned carton of a suitable material to prevent damage due to shocks during transit. The lid of the cartoon may be suitably sealed. A suitable number of sealed cartons may be packed in a case adequate strength with extra cushioning if considered necessary. The cases may then be properly sealed against accidental opening in transit. The packing cases may be marked to indicate the fragile nature of the contents.

5.02The following information shall be furnished with the consignment :

- Name of consignee.
- Details of consignment
- Destination
- Total Weight of consignment.
- Sign showing upper / lower side of the crate.
- Sign showing fragility of the material.
- Handling and unpacking instructions.

- Bill of Materials indicating contents of each package and spare materials.

6.00 TRAINING OF ENGINEERS :

The successful supplier contractor shall train Engineers of the Purchaser free of charge at their works for familiarization of design, application, operation and maintenance of the instrument.

7.00 SCHEDULES :

The tenderer shall fill in the following schedules which are part and parcel of the tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule C - Tenderer's experience.

Schedule F - Proforma of Undertaking.

The tenderer shall submit the list of orders for similar type of equipment, executed or under execution during the last three years, with full details in the schedule of tenderer's experience (Schedule 'C') to enable the purchaser to evaluate the tender.

SCHEDULE - C
SCHEDULES OF TENDERER'S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by Purchaser in case he considers such a reference necessary.

Sr. No.	Name of Client and Description of Item	Value of Order	Period of Supply and ommissioning	Name and Adress to whom reference may be made
1	2	3	4	5

NAME OF FIRM_____

NAME & SIGNATURE OE TENDERER_____

DESIGNATION_____

DATE_____

SCHEDULE - F
PROFORMA OF UNDERTAKING

We hereby confirm that H.V. Cable Fault Locating System offered by us against this tender are of the same design and type as have been supplied to MSEDCL against earlier Order No. dtd. and all the type test reports thereof were approved by C.E.(Dist.) vide letter No. dtd. (copy enclosed).

We further confirm that the said type tests have been carried out at the laboratories accredited by NABL within five years prior to the date of opening of present tender.

NAME OF FIRM _____

NAME & SIGNATURE OF TENDERER _____

DESIGNATION _____

DATE _____

Sr.No.	GTP Parameters(HV Cable Fault Locating System)	BIDDERS OFFER
1.	Surge Generator (Thumper)	
2.	Reference Standard - IEC or Equivalent	
3.	Manufacturers Name and Address	
4.	Manufacturers Type	
5.	Manufacturers Authorization	
6.	Voltage Range in KV - in steps i) 0-8 KV;ii) 0-16 KV iii) 0-32 KV	
7.	Discharge Energy in Joules -2000 J (Min.) for each voltage range	
8.	Voltage Adjustable -	
9.	Display -Analogue / Digital	
10.	Cycle time- 3 to 10 seconds and single shot	
11.	Input Voltage - 230 V \pm 10% at 50 Hz	
12.	Operating Temperature Range - Upto -10°C To 50°C	
13.	Weight : not more than 125kg.	
14.	Computer aided digital cable fault pre-locator -	
15.	Measuring Range - 0 - 50 km.	
16.	Velocity of propagation - 10 to 150 m/usec.	
17.	Pulse Width - 40 ns 10 usec	
18.	Sampling rate - 1MHz to 200 MHz	
19.	Accuracy- \pm 0.2% of range	
20.	Display Colour - 10.4 full VGA display	
21.	Modes - Pulse Reflection, Impulse Current Method, Arc Reflection Method,Decay Method,Burn mode(20kv,0.1amp)	
22.	Memory and RS 232 port - Min. 50 memories RS 232 port serial as well as parallel	
23.	Input Voltage - 230 V \pm 10% at 50 Hz	
24.	Operating Temperature Range -Upto -10 °C to 50 °C	
25.	Current coupler/voltage coupler. Tenderer should supply accessories suitable for their prelocator	
26.	Arc Reflection Filter	
27.	Operating Temperature Range - up to 10 °To 50°C	
28.	Accessories to be supplied - To be supplied with all the necessary and standard accessories with instruction manual.	
29.	D.C. H.V Tester -	
30.	Test voltage -0-50 KV Variable	
31.	I max - 25mA	
32.	I/P Power -230V, \pm 10%, 50 Hz	
33.	Metering-Analogue/digital metering for current and voltage in form of Bargraph & numeric values.	
34.	Safety features - Thermal protection, overload protection, and automatic discharge facility, auxiliary earthing to substation should be provided.	
35.	Fault pin-pointing set	
36.	Reference Standard - IEC or Equivalent	
37.	Manufacturers Name and Address	
38.	Manufacturers Type	

39.	Manufacturers Authorization	
40.	Amplification Adjustment range -Acoustic channel > 110 dB Magnetic channel > 110 dB	
41.	Display - LCD 3 digit / 7 segment display	
42.	Frequency range with filter -Generally with in 100 Hz to 1.5 kHz for (Acoustic), & 100 Hz to 1,5 kHz with filter.	
43.	Power supply -Battery operated using AAA or AA or 6F22	
44.	Weight – (not more than 3.5kg)	
45.	Operating Temperature Range - upto 10 °C To 50°C	
46.	Accessories to be supplied - To be supplied with all the necessary and standard accessories, i.e. receiver, sensor, headphones, batteries carrying pouch along with instruction manual	
47.	Cable Route Tracer -	
48.	Reference Standard -IEC or Equivalent	
49.	Manufacturers Name and Address	
50.	Manufacturers Type	
51.	Manufacturers Authorization	
52.	Audio Frequency generator -	
53.	Out put Power -0-200W with suitable selectable steps.	
54.	Output frequency.	
55.	Load Impedance Matching - 0.5 ohms to 1000 ohms	
56.	Power supply - 230V,±10%, 50 Hz	
57.	Dimensions & Wt – (not more than 12kg & portable in size)	
58.	Operating Temperature Range - Upto-10 °C to 50 °C	
59.	Accessories to be supplied -To be supplied with all the necessary and standard accessories and instruction manual	
60.	Indication - Analogue indication.	
61.	Audio frequency receiver -	
62.	Reference Standard - IEC or Equivalent	
63.	Receiving frequency - 50 Hz, & output frequency of the generator	
64.	Gain - 100 to 7000 Hz.	
65.	Indications- LCD indication of signal & battery check	
66.	power supply 8x1.5 fry AA size battery	
67.	Power output 0-200 watts	
68.	frequency 480Hz,1450Hz & 9820Hz	
69.	Dimension & weight (not more than 3kg& portable in size)	
70.	operating temp.range 10°C to 50°C	
71.	Accessories to be supplied with all the standard accessories like search coil special type of headphone connecting leads along with instruction manual etc.	
72.	Cable Identification Instrument	
73.	Generator-	
74.	i)pulse voltage-55V	
75.	ii)pulse pick current minimum 50A	
76.	iii) Power supply - 230V,±10%, 50 Hz & battery operated	

77.	iv)Accessories connecting leads & carrying case	
78.	Identification Receiver	
79.	Sensitivity-min. 4 stage	
80.	Indication:Analogue(LCD or LED)	
81.	Power supply -9V dry battery	
82.	Identification Tong-	
83.	Flexible Tong diameter suitable for 300 sq.mm.	
84.	Accessories connecting leads & carrying case	
85.	Protection class-IP 54	
86.	Cable, Cable drums and trolley and other accessories -	
87.	HV Output cable of insulation 40kv.	
88.	Mains cable 50 Mtr Long.	
89.	Earthing cable 50 Mtr Long	
90.	Cable Discharge Rods	
91.	Cable Drums - Hand operated drum Suitable for rewinding of HV cable, mains cable& Earthing cable.	
92.	Trolley - The Surge generator, digital cable fault prelocator, D.C testing set up ,arc reflection filters and cable drum forming a compact portable fault locating system shall be mounted on suitable trolley with all.	
93.	Guarantee and training	
94.	Guarantee - All the supplied equipments accessories shall be guaranteed for 5 years with free replacement in case of any manufacturing defects.	
95.	Training -Successful bidder shall impart theoretical as well as practical training to testing engineers and staff at site, at various locations	

**'ANNEXURE – 'D-2'
TECHNICAL SPECIFICATION FOR L.V. CABLE FAULT
LOCATING EQUIPMENT**

TECHNICAL SPECIFICATION FOR L.V. CABLE FAULT LOCATING EQUIPMENT

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Technical Specifications of L.V. Cable Fault Locating System

1. The system should be portable, Trolley mounted, multifunctional system for testing fault in low voltage networks.
2. The system should have built command knob and must have a graphic display for test modes and parameters.
3. The system must have high surge output for acoustic pinpoint location of faults in all types of underground low-tension faults.

1. TECHNICAL SPECIFICATIONS:

Cable fault locating system shall be a integrated unit having surge generator with equipment to locate the cable faults in LT cables with following specifications.

1. Low Voltage Surge Generator (Thumper) :

The Low Voltage Surge Generator should be suitable for pinpoint location of open circuit, short circuit, ingress moisture type of faults in L.T. network.

Sr. No.	Particulars	Tech. Specifications
1	Surge Voltage Range	0-2KV & 0-4KV continuously variable
2	Energy Out Put	1000 Joules at 2kV & 4kV
3	Surge rate	Single pulse 2 to 12 second
4	Leakage Display	0-1mA, 0-10mA
5	Indication	Mains ON, H.V.ON,
6	Pulse Ratio	1:3; 1:6 sec.
7	Metering	Analogue /digital for Out put Voltage and current
8	Protection	Zero Interlocks, Tripping fuses for HV/LV controls
9	Other Accessories	1) HV cable of 5 kV class of insulation 10 meters long with suitable connecting clamps and 2) Earthing cables of 10meters long with suitable connecting clamps. 3) Mains cables of 10 meters long All Cables shall be supplied on rewindable cable drums mounted on separate trolley.
10	Size & weight	Size should be manually carriable & weight should not be more than 50kg.
11	Operating Temperature	-10°C to +50°C

2. Digital cable fault Pre-Locator for L.V. (Time Domain reflectometer)

This shall be the integral part of the fault locating system with following technical parameters. It shall display the distance of the fault on the branched cables also easily.

The Details shall be as follows.

Sr. No.	Particulars	Tech. Specifications
1	Mode of Operation	Pulse Reflection
2	Measuring Range	0 to 10 Km
3	Resolution	should have good Resolution
4	Fault Measuring Accuracy	$\pm 0.1\%$, ± 1 Meter
5	Velocity of propagation	50 to 150 m/micro sec.
6	Display	Colour back lit LCD display
7	Memory	Shall have capacity to store at least 10 wave forms
8	Power Supply	Shall work on single phase 230 V AC supply as well as on internal Rechargeable Battery, & with External D. C. Input of 12 V.
9	Weight & size	It should be light in weight & compact in size.(weight not more than 1.5 kg)
10	Accessories	Trolley - Cable fault locator (TDR) & Surge Generator along with cable drums shall be mounted on suitable trolley for easy transportation. Equipment shall have proper protection so that it can be safely utilized to detect cable faults during raining.

1) Equipment should be able to prelocate open circuit, short circuit type of fault.

2) Equipment should be able to locate event (fault) location automatically at the press of a button the 'Automatic Event Location' function

2. Fault Pickup Set (Sismo phone)

Equipment should be able to pinpoint the fault in Noisy, crowdey, Concrete & Tar roads of the city. Equipment is to be used with Surge Generator in both acoustic as well as magnetic modes.

Sr. No.	Particulars	Tech. Specifications
1	Display	3 digit 7 segment LCD Display with backlightseparate channel for Acoustic & Magnetic, overflow display for distance value >100 msec.
2	Broad band frequency range	Magnetic/ Acoustic -100Hz to 1.5KHz(W/O filter) Magnetic/ Acoustic-100Hz to 1.5KHz (with filter)
3	Amplification Gain	Acoustic - > 110 dB Magnetic - > 110 dB
4	Impedance for Ground microphone & Headphone	500 Ohm
5	Weight & size	It should be light in weight & of small size so that the operator can walk easily & concentrate on the fault easily.(weight not more than 3.5 kg)
6	Power supply	10 x 1.5 V. batteries AA size.
7	Accessories	1) Ground Microphone suitable for pinpointing & sensing the acoustic as well as magnetic signals in concrete road, tar road, rocky & sandy soil. It Should be wind protected. 2)Special Head Phone suitable for hearing & listening the lowest possible acoustic signal.
8	Protection class	Min IP 55

It should also have switchable filter against ambient noise, bar graph indication. It should also have indication of battery condition, rugged build for field operation & high reliability in working during rainy season.

4. **Cable Route Tracer :**

The audio frequency cable route tracer should be ideal for locating the route of underground cable as well as for pinpointing the short circuit cable faults.

Technical Specification:

a) Audio Frequency Generator

- 1) LF output power: 0-20 Watt with selectable suitable ranges
- 2) O/p frequencies: to be specified by the supplier
- 3) Distortion factor at resistive load and matching Automatic/manual
- 4) Output Adjustment: From 0.5 ohm to 1000 ohm.
- 5) Permitted load resistance: Any short circuit, open circuit continuous but with reactive loads etc.
- 6) Power Supply: Unit should be capable on mains AC supply, 230 V, 50Hz

b) Audio Frequency Receiver

The audio frequency receiver set should be battery operated and suitable to above frequencies. The receiver should be connected directly to the search coil. The coil can be rotated to 0-45 Degree or 90 Degree span in position for added versatility. It should have set forth high impedance and should provide maximum attenuation to external noise.

2. TYPE TEST :

2.1 The tenderer shall furnish detailed type test reports of the offered instrument for all the test as per relevant standards. All the above type testes shall be carried out at laboratories which are accredited by the National Board of Accreditation of Laboratories (NABL) of Government of India to prove that the instruments offered meet the requirements of specification. However, the tenderers who have supplied the offered instrument to MSEDCL against order from Central Purchase Agency of MSEDCL shall be exempted from submission of type test reports against this tender provided that.

i) Their offered instruments are already fully type tested at Laboratories accredited by the National Accreditation Board for testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender.

ii) There is no change in the design of type tested instruments and those offered against this tender.

iii) Such tenderers complying (i) & (ii) above, shall furnish an undertaking in the format schedule 'F' enclosed herewith.

2.2 The Purchaser reserves the right to demand repetition of some or all the type tests in presence of purchaser's representative at purchaser's cost. For this purpose, the tenderer shall quote unit rates for carrying out each type test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in type test, the complete supply shall be rejected.

The Successful tenderer shall take approval / waiver of type test from C.E(Stores), MSEDCL, Prakashgad, Bandra, Mumbai Prior to commencement of supply.

In other cases where Indian/International Standards for the equipment is not available/specified, following test condition shall be made applicable against type test.

‘The tenderer shall furnish detailed Calibration report of the offered instrument carried out at standard NABL approved Laboratories on at least one of the equipment as per relevant standards to prove that the instrument offered meet the requirements of specification. Tenderer shall take approval/waival of calibration reports from C.E.(MMC), prior to commencement of the supply.

3.PRE DESPATCH INSPECTION:

The inspection shall be carried out at all the place of manufacturer unless otherwise. Specially agreed upon by the manufacturer and purchaser at the time of purchases. For imported equipments the supplier/tenderer shall offer the equipment at the authorized service centre /works of the original manufacturer in India or at the supplier’s works/Testing centre. The manufacturer shall offer to the inspector representing the purchaser all the reasonable facilities, free of charge, for inspection and testing to satisfy him that the material is being supplied in accordance with this specification.

The joint inspection of the equipment will be carried out by inspection wing & the appointed Executive Engineer testing division.

4. GUARANTEE :

The instrument shall be guaranteed for the period of five years from the date of commissioning or five and half years from the date of Dispatch whichever is earlier. The Instrument found defective within the above guarantee period shall be replaced / repaired by the supplier free of cost within one month of receipt of intimation. If the defective instrument are not replaced / repaired within the specified period above, the MSEDCL shall recover an equivalent amount plus 10 % supervision charges from any of the bills of the supplier.

5. PACKING:

5.1 The instrument shall be suitably packed in order to avoid damage or Disturbance during transit or handling. Each instrument may be suitably packed in the first instance to prevent ingress of moisture and dust and then placed in a cushioned carton of a suitable material to prevent damage due to shocks during transit. The lid of the cartoon may be suitably sealed. A suitable number of sealed cartons may be packed in a case adequate strength with extra cushioning if considered necessary. The cases may then be properly sealed against accidental opening in transit. The packing cases may be marked to indicate the fragile nature of the contents.

5.2 The following information shall be furnished with the consignment :

- Name of consignee
- Details of consignment

- Destination
- Total Weight of consignment.
- Sign showing upper / lower side of the crate
- Sign showing fragility of the material.
- Handling and unpacking instructions.
- Bill of Materials indicating contents of each package and spare materials. .

6. TRAINING OF ENGINEERS :

The successful supplier contractor shall train Engineers of the Purchaser free of charge at their works for familiarization of design, application, operation and maintenance of the instrument.

7. SCHEDULES :

The tenderer shall fill in the following schedules which are part and parcel of the tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule C - Tenderer's experience.

Schedule F - Proforma of Undertaking.

The tenderer shall submit the list of orders for similar type of equipment, executed or under execution during the last three years, with full details in the schedule of tenderer's experience (Schedule 'C') to enable the purchaser to evaluate the tender.

SCHEDULE - C
SCHEDULES OF TENDERER'S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by Purchaser in case he considers such a reference necessary.

Sr. No. & Description of Item reference may be made	Name of Client Order	Value of and Commissioning	Period of Supply Addressto whom	Name &
1	2	3	4	5

NAME OF FIRM_____

NAME & SIGNATURE OE TENDERER_____

DESIGNATION_____

DATE_____

SCHEDULE - F
PROFORMA OF UNDERTAKING

We hereby confirm that L.V. Cable Fault Locating system offered by us against this tender are of the same design and type as have been supplied to MSEDCL against earlier Order No. dtd. and all the type test reports thereof were approved by C.E.(Dist.) vide letter No. _____ dtd. _____ (copy enclosed).

We further confirm that the said type tests have been carried out at the laboratories accredited by NABL within five years prior to the date of opening of present tender.

NAME OF FIRM_____

NAME & SIGNATURE OE TENDERER_____

DESIGNATION_____

DATE_____

Sr. No.	GTP PARAMETERS(LV Cable fault locating system)	BIDDERS OFFER
A	L. V. Surge Generator (Thumper)	
1.	Reference Standard-IEC or Equivalent	
2.	Manufacturers Name and Address.	
3.	Manufacturers Type	
4.	Manufacturers Authorization	
5.	Voltage Range in KV-0-2kV & 0-4kV continuously Variables	
6.	Discharge Energy in Joules -1000 Joules at 2kV & 4kV	
7.	Surge Pulse-Single pulse,2 to12second.	
8.	Pulse Ratio-1:3; 1:6 sec.	
9.	Input Voltage-230 V \pm 10% at 50 Hz	
10.	Display - Analogue / Digital	
11.	Indication-Mains ON, HV.ON	
12.	Metering-Analogue/digital for out put Voltage and current	
13.	Protection-Zero Interlocks, Tripping fuses for HV/LV controls	
14.	Operating Temperature Range -10°C to +50°C	
15.	Other Accessories HV cable of 5kV class of insulation 10 meters long with suitable connecting clamps	
16.	Earthing cables of 10 meters long with suitable connecting clamps	
17.	Mains cables of 10 meters long .All Cables shall be supplied on rewindable cable drums mounted on trolley.	
18.	Discharge rod has to be supplied	
19.	Weight should not be more than 50kg, Size-shall be manually carriable	
B	Computer Aided digital cable fault Prelocator -(10km)	
20.	Measuring Range - 0 to 10 Km with pre interval steps like 50-100-200M, 1.6 Kms, 3 Kms,10Km.	
21.	Velocity of propagation- 50 to 150M/ μ sec.	
22.	Sampling rate -Up to 100 MHz	
23.	Accuracy - \pm 0.1 %, \pm 1 Meter	
24.	Pulse reflection method	
25.	Memory and RS 232 port -Shall have capacity to store at least 10 wave forms & RS 232 port.	
26.	Display	
27.	Power supply	

28.	Operating temp range upto -10 ⁰ c to +50 ⁰ c	
C	Fault pin pointing Set	
29.	Reference Standard-IEC or Equivalent	
30.	Manufacturers Name and Address	
31.	Manufacturers Type	
32.	Manufacturers Authorization	
33.	Amplification Adjustment range – Acoustic channel > 110 Db magnetic Channel>110dB	
34.	Display-LCD Display with backlight- separate channel for Acoustic & Magnetic	
35.	Frequency range with filter generally with in 100 Hz to 1.5KHz for (Aoustic)&100Hz to 1.5 KHz with filter	
36.	Power supply -Battery operated	
37.	Weight & size-It should be light in weight & small in size so that the operator can walk easily & concentrate on the fault easily.(weight not more than 3.5kg)	
38.	Operating Temperature Range- -10 deg. C to 50° C	
39.	Accessories to be supplied - To be supplied with all the necessary and standard accessories, i.e. receiver, sensor, headphones, batteries, carrying pouch along with instruction manual	
D	Cable Route Tracer -	
40.	Reference Standard- IEC or Equivalent	
41.	Manufacturers Name and Address.	
42.	Manufacturers Type	
43.	Manufacturers Authorization	
I	Audio frequency generator	
	i)output power – 0 to 20 watts	
44.	ii)output frequency-	
45.	iii)Power Supply- 230V ,±15% AC, single phase for Generator & battery operated for Receiver.	
46.	iv)Dimensions & weight -portable, light weight(max 12kg)	
47.	v)Operating Temperature Range . -10 deg.C to 50°C	
48.	vi)Accessories to be supplied - audio frequency generator, audio frequency receiver, search coil, special type of headphone, earthing spikes, connecting leads and wires along with suitable carrying case and manual.	
II	Audio frequency receiver	
	i) Reference Standard- IEC or Equivalent	
49.	ii)receiving frequency-50Hz&output frequency of the generator	
50.	iii)Indications LCD indication of signal & battery check	
51.	iv)power supply 8x1.5 fry AA size battery	
52.	v)frequency 480Hz,1450Hz & 9820Hz	

53.	vi)Dimension & weight portable light weight (max 3kg)	
54.	vii)operating temp.range 10°C to 50°C	
55.	viii)Accessories to be supplied with all the standard accessories like search coil special type headphone connecting leads along with instruction manual etc.	
E	Cable, Cable drums and trolley and other accessories -	
56.	HV Output cable of insulation 5kv.	
57.	Mains cable 25 Mtr Long.	
58.	Earthing cable 25 Mtr Long	
59.	Cable Discharge Ròds	
60.	Cable Drums - Hand operated drum Suitable for rewinding of 25 meters of HV cable, Mains cable& Earthing cable.	
61.	Trolley - LV Surge generator, digital cable fault prelocator are integrately mounted on suitable trolley along with cable drums with all the safety features	
F	Guarantee and training	
62.	Guarantee - All the supplied equipments accessories shall be guaranteed for 5 years with free replacement in case of any manufacturing defects.	
63.	Training -Successful bidder shall impart theoretical as well as practical training to testing engineers and staff at site, at various locations	