

SECTION -III

TECHNICAL SPECIFICATION FOR SUPPLY OF MINI-TRUCK/ VAN MOUNTED SINGLE PHASE MODULAR CABLE FAULT LOCATING EQUIPMENT SUITABLE FOR LOCATING FAULT ON LOW /MEDIUM / HIGH VOLTAGE POWER CABLES UP TO 33 KV AGAINST TN-2499.

OBJECTIVES AND SCOPE OF WORK:

1.0 SCOPE :

- 1.1 This specification is intended to cover the design, manufacture, assembly, testing at manufacturer's works, supply, delivery, installation & commissioning of Special General Purpose Mini-Truck / Van Mounted Single Phase Modular Cable Fault Locating Equipment Suitable for Locating Fault on Low /Medium / High Voltage Power Cables up to 33 KV Complete with all materials and accessories for efficient and trouble free operation.
- 1.2 It is not the intent to specify completely herein all details of the design and construction of equipments. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee in a manner acceptable to the Purchaser, who will interpret the meanings of drawings and specifications and shall have the power to reject any work or material which in his judgment is not in accordance therewith. The offered equipment shall be complete with all components necessary for its effective and trouble free operation along with associated equipments, interlocks, protection schemes etc. Such components shall be deemed to be within the scope of supply, irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
- 1.3 The scope covers complete design, engineering & supply of the Comprehensive Van Mounted Multifunctional Cable Fault Locator system shall be used for Cable Fault conditioning (burn-down), Pre-Location, Route Location, Pin-pointing & Testing of HT & LT cables of different types & sizes. The set shall be suitable to carrying out the above-mentioned multifunction on power cables of various voltage levels mainly 33KV, 11KV, 415V and control cables with 1.1 KV grade. The set shall be used for cable types namely XLPE, PVC, PILC with Al / Cu conductor. The cables are laid underground (under plain earth, trenches, or RCC surface), above ground or partly under & partly above ground with maximum cable length around 25 Km.
- 1.4 The several runs of cables of different voltage levels are laid on common racks / underground trench and during the cable fault identification process, nearby cables shall be in charged condition; hence the accuracy of the set being offered shall not suffer due to the above. The set shall be capable to identify and locate faults for all types of cable faults including high resistance, low resistance or intermittent / flashing faults using a single or combination of units in the set. Vendor shall specifically mention the use of individual unit being offered for the particular type of fault with range. The various units being offered by the vendor as a comprehensive multifunctional set shall be fully compatible with each other, wherever required.

- 1.5 The Technical specification required of the various units attached to the comprehensive multifunctional set for Cable Fault conditioning (burn-down), Pre-Location, Route Location, Pin-pointing & Testing are given below. Point-wise conformity to the specifications shall be submitted along with the offer without which the offer shall be liable for rejection.

The comprehensive cable fault locator set shall be suitable for fault locating and pinpointing the following types of cable faults viz.

- High resistance
- Low resistance
- Intermittent type or flashing faults.
- Sheath Fault location

The type of faults The Comprehensive Van Mounted Multifunctional Cable Fault Locator system shall be used for Cable Fault conditioning (burn-down), Pre-Location, Route Location, Pin-pointing & Testing of HT & LT cables of different types & sizes may be 3-phase short circuit, ground fault, phase fault and open circuit.

The cable fault locator set should be suitable to locate cable fault and trace cables in areas with multiple energized / de-energized cables in the same route without affecting the accuracy.

2.0 **STANDARDS:**

- 2.1 The equipment shall conform to the latest edition of the relevant standard. The bidder shall mention the applicable standard and shall furnish a copy of the authentic English version of the standard along with the offer.
- 2.2 Equipment meeting with the requirements of any other authoritative standards, which ensure equal or better quality than the standard mentioned above shall also be acceptable. If the equipment offered by the Bidder conforms to any other standard adopted and the specific standards shall be clearly brought out in relevant schedule. Two copies of such standards with authentic English Translations shall be furnished along with the offer.

3.0 **CLIMATIC CONDITIONS:**

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions:-

S. No.	Particulars	value
1.	Peak ambient air temperature in shade.	55 DEG C
2.	Minimum ambient air temperature in shade	(-) 5 DEG C
3.	Maximum relative humidity.	95%
4.	Minimum relative humidity	10%
5.	Dust storms are liable to occur during the period	from March to July
6.	Height above mean sea level	less than 1000M
7.	Average number of thunder storm days per annum.	65 DAYS
8.	Average annual rainfall	10-100 cm (Depending on area)

9.	Number of months of tropical monsoon conditions p.a.	4
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Note:

Climate may be moderately hot and humid tropical conducive to rust and fungus growth. The climatic conditions are also prone to wide variations in ambient conditions. Smoke is also present in the atmosphere. Heavy lightning also occurs during June to October.

4.0 GENERAL REQUIREMENT

The system should be capable for conducting the following functions:

- a) Cables to be tested up to 33kV.
- b) Pre – locating of faults by the following method
 - Pulse Reflection Method (Pulse Echo)/TDR Method
 - Secondary Impulse Method / ARC Reflection Method (ARM)
 - Impulse Current Method.
 - Decay Method
- c) DC Test set 0-32 kV or more.
- d) Surge generator 0-32 kV
- e) Pin Pointing of cable fault using acoustic method, coincidence method and delay time mode method with suitable display to indicate various parameters.
- f) Cable route tracing by audio frequency generator or any other latest technique in order to give depth of the cable etc. on LCD display.
- g) Cable identification from bunch of cables
- h) Megger 0-10 kV (With 5 mA Short Circuit Current) (Reputed Make i.e. Megger, AVO)
- i) Cable Drum Rack

4.1 The single phase measuring set up shall be provided with 50 mtr of HT cables, LT main cable, earthing cable, and RF cable.

Note: Cables shall conform to relevant standards.

4.2 The CFL van shall have practical safety devices including automatic checks interlocking circuit, built if forced discharge circuit and the high voltage can be prepared only after all prerequisites are checked by the safety circuit so as to ensure that no damage is caused to the equipment in case the surge lead is connected to a live HT cable accidentally that is necessary protection against back feeding to be provided in any of the cases described below.

4.3 The output voltage shall remain turned off or cannot be turned on in case of :

1. Undue voltage rise in the output on earthing connection on the surge capacitor.
2. Flash over in the testing mode.
3. Thermal overloaded of the voltage stages of particular component such that the cause of disconnection shall be indicated by signal lights (LED's).
4. If the back door/ HV side of the VAN is open.

4.4 The complete system shall be made operative via centralized control unit responsible for various functions i.e. testing, burning, surging and SIM mode and continuous monitoring of the safety circuits shall be indicated via LEDs.

- 4.5** The control unit shall be provided with suitable voltage meter and ammeters.
- 4.6** The system should be capable of locating all types of permanent and transient faults viz. core shorts, core to earth shorts, high impedance faults, core breaks, flash over etc.
- 4.7** The system should work on input supply of 220 V \pm 10%. 50 Hz single phase supply to safeguard the equipment against the abnormally high / low voltage current, the power supply current with a suitable protection system should be incorporated in power supply system. The equipment should be suitable for operation in JAIPUR DISCOM where ambient temperature may go up to 50 deg C. The supplier shall commission the equipment and guide our Engineers in the testing procedure with complete literature of the equipment.

5.0 CERTIFICATE AND INSTRUCTION BOOK :

The supplier/contractor shall be required to furnish to the purchaser office/consignee, whichever is necessary the following documents along with the consignment.

- Printed pamphlets/catalogues.
- Instruction Book
- Test Certificates.
- Guarantee card.

6.0 DETAILED TECHNICAL SPECIFICATION :

The cable fault locating system shall consist of the following:

- Microprocessor based Transient Recorder/Fault Locator.
- D.C Test, Surge and Burn Units.
- A pin – pointing set, cable route tracer, cable identification set and measuring wheels etc. should be supplied. All necessary cables should be supplied suitably mounted on drums. The system shall work on input supply of 220 V \pm 10%, 50 Hz, \pm 5% single phase.
- Constant monitoring of all safety circuits such as monitoring circuits etc to be in built in control unit.

6.1 COMPREHENSIVE INTEGRATED HV FAULT PRE-LOCATON & CONTROL UNIT :

Pre-location of faults in cables shall be carried out using the principle of Secondary Impulse Method/ Arc Reflection Mode with the help of highly sophisticated Menu driven microprocessor based Digital Fault Locator. The equipment should have at least following features:

- Should be fully menu-guided
- Should feature interactive menu-guidance
- Should have automatic cursor setting for fault location
- Should have measuring input voltage proof min 250 V
- Display should be color LCD.
- Should have facility for printer connection via RS 232/USB
- Should have facility for data transfer to PC through RS 232/USB
- Should have facility for memory up to 100 records.

- Suitable software to be provided for handling, storage and analysis of results as a part of the unit.
- It should have automatic far end indication and fault recognition with distance indication.
- The instrument shall have the features to display the fault trace and continuous reflection traces. In addition the instrument should have a feature to display differential trace of faulty cable with respect to a healthy cable.
- **Should support following methods:**
 - Pulse Echo Method / Time Domain Reflection (TDR)
 - Secondary Impulse Method (SIM)/Arc Reflection Method
 - Impulse Current Method (ICM)
 - Decay Method .

Technical data:

- Output voltage of transmitting pulse: Min 10V up 60 V
- Pulse width of transmitting pulse: (40ns ... 04us) min
- Voltage withstand: 250V AC (50/60 Hz)
- Output impedance: 20-150 Ohms Auto ranging as well as manually selectable.
- Measuring ranges @ $v/2=80\text{m}/\mu\text{s}$: 50m-50Kms Auto ranging as well as manually selectable.
- Measuring accuracy: Within 3Mtr in all ranges
- Sampling rate: 200 MHz
- Resolution: min 1.5 m
- Propagation velocity $v/2$: 100-150 m/ μs
- Number of memories: at least 100
- Display: LCD display
320x240 resolution
- Power supply for operation and/or charging: 100-240V (50/60 Hz)
- Operating temperature: -20 ... +55°C
- Storage temperature: -20 ... +60°C

Dimensions : To be specified by the Bidder
 Weight : To be specified by the Bidder

6.2 DC High Voltage Test set :

It shall also be possible to carry out the Insulation Testing and high voltage DC testing of the cable under test from the same unit. The comprehensive set shall be utilized for performing the high voltage DC testing of the cables for accessing the health of the cable insulation by measuring the leakage current. It shall have the following features:

- (a) The unit shall be handy/Van Mounted and of rugged construction. It shall have built in discharge unit for automatic discharge after shutdown.
- (b) The set shall have all the safety features necessary for the protection against high voltage e.g. auto discharging after switching off, high voltage ON/ OFF with security, Auto-OFF in case of break in power supply etc.
- (c) The DC Cable Test Voltage of the Set shall have a range of 0 – 32 KV min DC Voltage.

- (d) The set shall be provided with an adjustable leakage current range up to at least 50mA with a minimum resolution of 1 mA. It shall also be provided with a leakage current indicator.
 - (e) The set shall automatically trip on the leakage current exceeding the set limit value with the display of breakdown voltage.
 - (f) The unit shall include mains leads, earth cable, HV connecting cable, earth terminals, battery connecting cables with battery clips, all required and related accessories with carrying case and users' manual with complete operating and maintenance instructions.
- D.C. Testing: 0-32KV min DC Continuously adjustable (Auto Ranging)

6.3 Surge Generator Unit:

The Surge Generator Unit shall be used as thumper for charging of cable under test (i.e. defective cable) till sufficient flashover is achieved at the point of fault. The set shall be used in conjunction with Surge Receiver Unit for fault pinpointing. It shall have following features:

- (a) Surge Voltage Range: 0-4KV, 0-8 KV, 0-16 KV & 0-32 KV
- (b) Surge Energy: Minimum 2000 Joules in each range except 0-4KV where it should be 1500 Joules
- (c) The set should be provided with standard safety features like 'Zero start voltage interlock', ' High voltage ON lamp', automatic grounding upon shutdown, Auto-OFF in case of power supply break and overload protection with circuit breaker etc.
- (d) Surge rate: continuously variable from 3 Sec to 8 Sec min. & Single impulse feature shall also be available.
- (e) The unit shall be compatible for use with Surge Receiver Unit and Arc Reflection Unit.
- (f) The unit shall include mains leads, earth cable, HV connecting cable, earth terminals, battery connecting cables with battery clips, all required and related accessories with carrying case and user's manual with complete operating and maintenance instructions.

Impulse	:	0-32 kV in suitable steps of 0-8/0-16/0-32 kV and each step continuously variable.
Surge Energy	:	2000 Joules (Min)
Impulse interval	:	Single shot, 20 per minute approx.
Safety Protection	:	- 2 automatic discharging devices (internal and external discharge) - Reliable operated surge switch electromagnetic operated - Separate system and protection grounding device - Safety control circuit according to VDE 0104
Fault Burning	:	Up to 210mA (min.)

Surge Generator LT or Thumper

Voltage Range	:	0-4KV
Discharge Energy in Joules	:	1500J min

6.3.1 Filter Unit or ARC reflection Filter Unit or ARC Stabilizing:

Generally pulse echo or reflection method is applied for cable fault location however it may not be suitable for high impedance or resistance faults. Therefore to overcome these limitations in pulse echo method, a suitable band pass filter unit should be supplied to stabilize this ARC at the flashover or the point of fault.

The offered filter must simplify the operation causing less stress, causing minimum damage on the tested cables to detect the high resistive faults. There should be complete compatibility of TDR, Surge Generator/Thumper with the filter unit. This unit must filter or stabilize the arc at the fault point and record the same in the supplied TDR to compare it with previous trace recorded without the filter unit in the same core. Suitable coupler for coupling the filter unit with the TDR and Surge generator must be supplied.

The offered filter must contain switching elements necessary for the triggering and the coupling of the pulse. After the pre-location using the SIM/ARM method, there must be a decoupling element which must pass the surge generator for making it ready for use in pinpointing the cable fault. The control unit should connect automatically the filters with appropriate coupler with the surge generator and TDR when ARM/SIM mode.

6.3.2 Inductive coupler:

Inductive Coupler for pre-location of high resistance faults with a Surge Voltage Generator according to the Impulse Current Method (ICM).

6.3.3 Capacitive coupler:

Capacitive voltage divider for location of intermittent cable faults up to 32 KV to perform the Decay Method.

6.4 Integrated Fault Conditioning Unit (Burn-Down Set):

This set shall be capable for burning down high resistance faults in cables to facilitate the fault pre-location. The Unit shall have the following features:

- (a) The voltage range of the Burn-down Unit shall be at least up to 0-32 KV with adjustable current up to or more 210 mA.
- (b) The unit shall be provided with applied Voltage & fault discharge current meters.
- (c) The Unit shall be provided with a thermal overload protection and shall have auto-reset feature.
- (d) The Unit shall be provided with protective terminals to prevent accidental contact.
- (e) The Unit shall be provided with safety earthing facility for safe operation.

6.5 Surge Wave Receiver Unit (Pin-Pointing Set):

It shall function as a directional acoustic listening device for pinpointing of flashover faults in underground power cables. It shall have the following features:

1. The unit shall be handy & rugged, and shall comprise of receivers, headphones, sensors, amplifiers and any other auxiliary items as necessary for operation of the unit. The set should provide detection of both acoustic and electromagnetic pulses emitted from an arcing fault when it is surged.

2. The set should be able to determine the proximity and direction to the cable fault by measuring electromagnetic surge and acoustic emission.
3. The set should be able to measure the time delay between acoustic and electromagnetic signals.
4. In the acoustic mode the set should have a feature to filter and eliminate background noise and electromagnetic interferences.
5. It should be able to pinpoint the exact location of the fault.
6. The instrument should be battery operated.
7. The set should have mute feature to activate while in motion.
8. It should have adjustable feature for adjusting the electromagnetic gain & acoustic gain.
9. It should have an LCD display with backlit feature.
10. The unit shall be provided with acoustic headphone set to receive the acoustic signal for pin pointing the fault point.
11. The LCD display shall indicate the cable route through the electromagnetic signal in bar graph form & the proximity to fault point by a numeric display.
12. The unit shall include lightweight receiver with carrying straps, handy sensor, all required and related accessories with carrying case and user's manual with complete operating and maintenance instructions.

Features:

- Acoustic method including manhole distance location
- Accurate route tracing
- Digital indication of proximity of the fault
- Cable depth measurement in combination with the surge coil
- Water-resistant design
- Integrated head phone
- Large illuminated LCD display
- Digital filters for suppression of traffic noise
- Easy menu operation
- Lightweight

6.6 CABLE ROUTE TRACER:

The Cable Route Locator shall be suitable for cable fault location process of underground cables by identifying the cable from the surface, without excavation. The equipment shall be capable of tracing the buried cables with the ability to measure the depth of the cable. The unit shall have at least the following features:

- a. The set shall comprise of a transmitter & receiver.
- b. The set shall be battery operated (rechargeable) and portable type, rugged construction with necessary accessories & bag / case.
- c. The cable tracing shall be done with audio & visual signals so as to make it easy to follow & trace the cable route.
- d. It shall be possible to detect the depth of the cable (at least 4 meter) at any point by using sufficient wattage of the generator up to 45 watts at least.
- e. Automatic impedance matching shall be required for better operations.
- f. It shall also be possible to detect the AC signals (50 Hz) from a charged cable without transmitter.
- g. Filters shall be provided to optimize the measurements and minimize the ambient noise.

- h. The transmitter of the tracer should be capable of energizing the cable either by magnetic induction or by direct conductive connection to the cable.
- i. The receiver should filter out electric noise and static noise.
- j. The unit should also be able to determine the depth of the cable.
- k. The unit should be suitable to trace cables in areas with multiple energized / de-energized cables in the same route.

a) Audio Frequency Generator:

The audio frequency generator should be ideal for locating the route of underground cable as well as for pinpointing of cable faults when used with receiver and identification of particular cable from the bunch of the cables.

Technical Specification:

LF output power:	0-50Watt or more (adjustable normally or automatically)
O/P Frequencies:	To be indicated by the bidder/contractor.
Output Adjustment	to be specified by the bidder
Permitted load resistance:	any short circuit, open circuit, continuous but with reactive load etc
Power Supply:	Unit should be capable to work on mains AC supply with built in charging and battery unit.

b) The 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 deg spans in position for added veracity should have set fourth high impedance and should provide maximum attenuation of external noise.

6.7 Cable Identification Set:

The system is to be used for selection of single core and multi core cables from a bunch of cables. The system should consist of a transmitter and Receiver unit and shall be light, portable, with facility to identify even live cables. The unit should be completely menu – driven, with graphic display.

Technical Data

Transmitter

Output voltage	: 100V (min.) (15 pulses/min)
Output current	: 30A (min.)
Power Supply	: 230v, 50 Hz/ Battery operated

Receiver

Display	: Graphic LCD/ Analog signal
Sensitivity	: 100%; at 400 Ω loop resistance
Power Supply	: Battery operated

6.8 Connection Cables:

All the cables required for the operation of the cable Fault Locating system shall be at least 50 mtrs. Mounted on suitable drums along with RF cable of 50 mtrs. Cable for operating the fault locator in detached mode Viz. earthing cable, main cables, HV cable, auxiliary earthing cable.

Cable drum rack

Hand operated cable drums with lockable brakes for accommodation of:

- 50 m high voltage cable
- 50 m mains cable 3x4 mm²
- 50 m ground cable 16 mm²
- 50 m RF cable (TDR)
- 50 m Auxiliary Cable 16 mm²

High Voltage Cable

50 m flexible HV coaxial cable with coaxial plug, connection clamps and strain relief

Rated voltage: 80 kV DC -

Insulation material: EPR

Mains cable

50 m, 3x4 mm², with mains plug

Mains plug type CEE 32A

Ground cable

50 m with tapping ferrules every 3 m, including clamps

Type: YF 16 mm² transparent

RF Cable

50 Meters for connecting the TDR to the faulty cable. This should be separate as the combination of HT and TDR cable shall not be suitable as the HT cable generally gets faulty in operation.

Auxiliary earth cable

15 Meters for creating an auxiliary earth in case of non availability of system earth to safeguard the system.

6.9 Tools:

The following Tools shall be supplied.

- Discharging Rods 80 KV
- Measuring Wheel,
- Operator Cabin Fan
- Earth Spikes
- Digital Multi-meter Reputed make
- Megger 0-10 KV (5 mA short Circuit Current)
Make: Megger, AVO or equivalent make
- Set of spanners, screw drivers etc.

Any other tool not mentioned above but otherwise required should also be supplied.

6.10 Safety Measure:

The control unit should be Computerized (menu driven) based and responsible for all the control operation of various functions such as Mode Selection Surge Test, Burn and Arc Reflection, Range Selection, Voltage and current limit adjustment, Surge sequence selection, auto discharge, earth monitoring, etc. from a single button and no access to the high voltage side shall be available to the operator as well as Operator guidance with on-screen help texts.

The control unit should provide a visual indication of failure of safety circuits/incorrect selection etc. with possible corrective methods. Constant monitoring of all safety circuits such as earth monitoring circuit etc. should be inbuilt

into the control unit, safety interlock monitoring etc. Safety function should be incorporated in the van suitably.

6.11 Mounting Van for the Comprehensive Set:

All the Units of the Comprehensive Van Mounted Multifunctional Cable Fault Locator system consisting of Cable Fault conditioning (burn-down), Pre-Location, Route Location, Pin-pointing & Testing of HT & LT cables shall be mounted on a suitable Equipment Mounting van with Power Supply connection arrangement fitted with at least four heavy duty wheels and one hook at the front for facilitating transportation by means of a vehicle. However, it shall be also possible to use each unit of the comprehensive set independently for the respective functions.

6.12 Mounting, Pre wiring and Mechanical fittings on Van:

Steel frame for mounting the following instruments:

- i) Computer Aided fault locator
- ii) High pressure test: All the equipments should be mounted on steel frames.
- iii) Rotating cable drums should be provided for:
 - HV cable drum-50m
 - Mains cable drum-50m
 - Earthing cable drum-50m
 - Auxiliary earthing drum-50m
 - R.F. cable drum-50m
- iv) Safety screens be provided to isolate the HV area from operating area.
- v) Suitable cupboards and tables for storing hand held instruments, writing desk.
- vi) Revolving chair for operator and sitting arrangement of 4 persons.
- vii) Diesel driven van with conditioning.
- viii) Fully carpeted side walls & roof for Electrostatic Protection.
- ix) Fully Insulated floor for safety.

7.0 Generator-set:

The generator-set shall meet the below mentioned specifications. & has to be placed at specially created housing in the van body / side body of the van.

Rated Output	5.6 KVA
Maximum Output	6.5 KVA
Rated Voltage	220 Volts
Frequency	50 Hz
Fuel	Petrol / 3 Ltr Per Hour
Starting	Self Start by key
Oil Alert	Provided
AVR	Automatic Voltage Regulation
Frame	Pipe Full Frame
Battery	Extra
Dimension (LxWxH) mm	708 x 548 x 493
Weight (Dry)	78 Kgs approx

Preferred make: HONDA/TOSHIBA

8.0 Specifications for Fabrication of CABLE FAULT LOCATING VAN ON TATA 407/TEMPO Traveler or equivalent vehicle.

I. Body Structure: The structure shall be made of steel sections as mentioned below & 12 mm thick Blata Packing with anti-vibration (Reinforced Rubberized Flat Section) over chassis frame:

- (a) Runner / Strengthening member – MS Channel 100x50x5mm
- (b) Cross Member - MS Channel 75x40x4mm
- (c) Floor frame - MS Angle 40x40x5mm
- (d) Super Structure (Hoop Sticks) - Top Flat section 40x40x2.5mm/
MS Square Tube 40x40x2mm
- (e) Super Structure(Roof Curvature/ Taper & Flat surface) - Top Flat Section 40x40x2.5mm
MS Square Tube 40x40x2mm
- (f) Entire structure , spring Leaf Floor Angles are to be anti-corrosive treatment
And paints .
- (g) TATA 407 should be in one cabin.
- (h) Rear End is to be provided with red reflectors.
- (i) Mud Guards are to be provided.
- (j) Ballata Packing (Rubber Packing between Chassis & body).
- (k) Stairs should be with aluminum checkered plate.
- (l) Lock Should be of good quality(Godrej with OEM certificate)
- (m)

II. Paneling:

- a) External - 18SWG G.L Sheet
- b) Roof - 20SWG G.L.Sheet
- c) Internal - Carpeting Over 3mm Fly.

III. Insulation: All Walls and roof will be insulated with 40mm thick thermocoal Sheet.

- Fully Carpeted side Walls & Roof for Electrostatic protection.

IV. Flooring: Base of Floor - Water Proof Ply 12mm thick Screwed through base floor of 3/6 mm MS .Sheet welded to floor frame.

Upper Layer - Vinyl Floor Sheet 2mm thick fixed over fly.

V. Doors:

- a) Hinged type doors (Double leaf inside collapsible) shall be provided for Main Compartment.
- b) Hinged Type outside open able (Ambulance type) rear doors
- c) Rear door to be provided with cable cutout section (6"x6")

VI. Windows: Adequate size of windows two way horizontal full sliding glass of 5mm thick Toughened glass encased in Aluminum Sections slide on Aluminum 'Z' Section in crew compartment. The window shall have including robust type locking arrangement from inside. In equipment portion both sides shall have fixed Window. All glass windows should be covered with removable metal frame with metal net.(Should be Protected from Stone).

VII. Electrical Fitments:

- a) 05 Nos. Light and 02 Nos. Light Battery Operated.
- b) Fan (3 nos.)

- c) Tube Lights and Fans should be mounted such that its frame should not touch or isolated from vehicle body.

VIII. Painting: Complete body of the Van will be Painted OFF WHITE colour With P.U. Paint after surface treatment.

IX. Others: Van will be fabricated as per standard fabrication practice and Specifications confirming to All India Motors Vehicles Act. Provisions of Standards Fitment will be kept such as First Aid Box, Fire Extinguishers, Rear Bumpers, Stepney, Cradle, Tool Box, Rear View Mirrors etc.

X. Guarantee (For VAN): Notwithstanding to that specified in this specification, the supplier is responsible to provide all necessary component for satisfactory working of the system in locating the fault in the cable. The VAN should be guarantee as per the manufacturer's specifications. The supplier shall have to offer to JVVNL the same standard Guarantee card of the principal manufacturer of the Van. Registration of the van shall in the name of purchaser.

11.0 Detailed scope of work:

The overall scope comprises to supply and installation of cable fault locating machine, training and post installation support.

(i) Supply and Installation of fault locating machine :

To supply cable fault locating system at office spread across the jurisdiction of the Discom. The supply and installation will be made at JvvnL site across the Discom. All the items will be in the name of JvvnL / licensed to JvvnL.

(ii) Operation and Training :

To provide classroom training to the 5 Nos. personnel of the Discom at each district headquarters, where the machines are to be supplied.

The vendor will provide training to Discom Personnel at district headquarter in at least one or more batches. Each batch will cover 5 people. The training will be provided by trained coaches who are competent in the subject.

NOTE: The supplier of the fault locating machine shall post one trained person at their own cost for operation of the cable fault locating system for one year on each district head quarter where the machine is to be supplied. During this period the person would locate cable faults as appear from time to time using fault locating machine and at the same time provide onsite training to the engineers/technicians of the JVVNL.

The vendor will have make its own arrangement of boarding, lodging, travel etc for its instructor(s) at the district headquarter.

(iii) Guarantee and post installation support :

All the supplied cable fault locating machines to have comprehensive onsite guarantee (inclusive of parts and labour) for 66 months from the date of supply or 60 months from the date of installation & commissioning. Post installation support as per the given service levels.

S. N.	Item	Service level
1.	General Purpose Mini-Truck/ Van Mounted Single Phase Modular Cable Fault Locating Equipment Suitable for Locating Fault on Low /Medium / High Voltage Power Cables up to 33 KV.	<p>To be attended within 12 hours</p> <p>The fault to be removed within 36 hours</p> <p>In case the problem remains unresolved for more than 72 hours then the Machine will have to be replaced with a standby.</p> <p>On repair of the fault the original machine will have be replaced with the standby machine</p> <p>If the repair is not removed within 1 Month, then the vendor will have to supply new Machine.</p>

The vendor will have to create a central help desk at Jaipur to register the complaints of the users. The help desk application should allow the help desk personnel log the user's complaint along with date and time.

The helpdesk will operate from 9.00 am to 6.00 pm on all working days. The list of holidays and regional offs are declared by the state government every year. The vendor will have to confirm the holidays / regional offs with JVVNL before assuming that the office is closed.

The help desk will have facilities management staff in adequate numbers in order to attend the problems as per the given service levels.

The help desk will have Fax / telephone / etc facility so as to find out the status of complaint / facility management personnel availability etc for communication with JVVNL.

These numbers will be informed to concerned SE (O&M) and the nodal officer in writing. Any change in the numbers will have to be informed immediately.

Help desk will have personnel and telephone in coming lines in adequate numbers to attend the complaint promptly. The complaint will be deemed to be rectified when the faulty equipment is rectified successfully and the facility management personnel takes the written sign off from the concerned officer in charge.

(iv) Extended Guarantee :

The extended guarantee period shall be for 5 (Five) years after expiry of the initial guarantee period of 5 (Five) years. The obligation of the supplier during extended guarantee period shall be same as defined in the initial guarantee period.

We intent to award post warranty annual maintenance and repairs contract for a period of five years. The annual maintenance & repairs rate contract includes cost of labour and materials/ components. A separate performance bank guarantee must be deposited by the successful tenderer at the rate of 5% of charges quoted for five year, before completion of the initial guarantee period of five years.

The extended warranty shall come into force after expiry of initial guarantee period, i.e., free service shall be provided in the extended guarantee period during which no charges of any sort shall be payable.

This would include minimum one monitoring visit, **once in a month**, by the supplier's representative.

The extended guarantee contract may broadly include the following.

- (a) Scheduled **monthly** inspection and maintenance of the equipment towards preventive maintenance based on specific need of the equipment.
- (b) Unscheduled on call corrective and remedial maintenance services to set right any malfunctioning of the equipment, replacement of unserviceable components, as per the nature of the complaint so that the equipment is placed in to service again. It is expected that such calls shall be attended within a period of 12 hours of receipt of such intimation from the field officers so that there is minimum down time of the equipment.
- (c) The format of reporting for said visit shall be mutually finalized after issue of order. The extended guarantee contract shall form part of supply contract. **The charges as would be quoted by the tenderer for such extended guarantee contract for 5 years shall be loaded in the quoted prices of the main equipment to arrive at computed adjusted prices for comparison purpose and to award contract to most economical proposal, i.e. supply of equipment + extended guarantee cost involved for 5 years after expiry of normal guarantee period of 60 months from supply.**

Payment of annual extended guarantee contract shall be made annually on prorata basis after expiry of one year period on verification of bills by the Engineer designated for particular station where services are to be rendered by the supplier.

(v) Penalty :

In case the supplier fails to adhere to attend the service level as mentioned above and also fails to provide standby machine within 72 Hours, penalty of Rs. 1000 per day subject to maximum of Rs. 25000.00 will be levied by JVVNL.

(vi) REPLACEMENT OF DEFECTIVE/DAMAGED MATERIALS:

Notwithstanding anything contained in the above liquidated damages clause when the whole or part of the supplied by the supplier are found to be defective/damaged or are not in conformity with the specification or sample, such defects or damages in the materials / equipments installed shall be rectified within 72 hours from the date of intimation/ information from the system of defect/damage either at the point of destination or at the supplier's works, at the cost of supplier, against proper security and acknowledgement. If the defects or damages are not rectified or replaced within this period, the vendor shall pay a sum towards liquidated damages as per liquidated damages clause given above, for the delay in rectification/replacement of the defects or damages. Though all substations are manned by Nigam employees/staff, the substation attendant of the utility shall ensure the proper upkeep of the system at field; however, contractor shall monitor the same for operational defects.

12.0 ADDITIONAL ORDER

Repeat orders for additional quantities, upto 50% of original ordered quantities, may be placed by the Nigam, on the same rates, terms and conditions given in the contract.
