# Technical Specification

**Eligibility Criteria for Participation [Qualification Requirement (QR)]**

## 1. Participation in the Tender

- Original manufacturers of Instruments in India will be eligible in the tender.
- For any non-indigenous Manufacturer having either manufacturing or assembling unit in India in collaboration with any registered Indian Company, are also eligible to quote.
- Distributor or Dealer or Agent or Channel Partner will be eligible for submission of quotation.
- Bidder will be OEM/OES in nature.
- Bidder must submit the performance certificate of at least Two customers who has been using since last 02 years
- Instruments should be calibrated from any NABL accredited Laboratory. Calibration certificate should bear NABL logo in each page. Calibration results shall comply with the specifications
- Warranty period should be at least 12 months
- Bids will be accepted only after meeting the technical requirement as per specification on site-demonstration

2. **Experience**: Experience in the field of manufacturing of Testing Instruments for last 5 (five) years.

## 3. Guarantee:

**a)** Manufacturer shall invariably give unconditional guaranty for minimum 01 year from the date of demonstration of the materials on delivery. The guaranty shall include calibration of all the Instruments including transportation during guaranty period. The terms and condition of the guaranty shall be attached along with the technical bid. The bidder shall quote separately for extended guaranty, if they wish. Regarding non indigenous Manufacturers, having either manufacturing or assembling unit in India in collaboration with any registered Indian Company, the guarantee should be provided by the Parent Company.

**b)** All the Instruments supplied against this specification shall be guaranteed for a defect liability of at least 12 months from the date of receipt at DTD store duly passed acceptance testing at DTD lab after delivery

**c)** Any Engineering error , omission, wrong provision, Instrument failure etc , the Instrument shall be attended by the bidder at free of cost during the defect liability period

**d)** For any defect in the kit during the defect liability period repairing ha to be completed within 15 days. Otherwise substitute set of same type has to be provided within 15 days from the date of reporting .It will be handed back to supplier on repair and receipt of original set

**e)** If any defect observed during defect liability period it is bidders responsibility to collect kit from site / consignee to attend the same

**f)** On each failure of Test set the supplier shall submit detailed report of failure analysis to Distribution Testing Department, WBSEDCL

**g)** Necessary Life time licensed copy of interfacing and analysis software with test kit should be supplied free of cost with test Instrument

4. Delivery: Instruments along with accessories to be delivered at Distribution Testing Department, Abhikshan Bhawan as per delivery schedule.

5. **Packing**: 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 carton may be suitably sealed. A suitable number of sealed cartons may be packed in a case of 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

6. Type **Test Certificate**: Submission of Type test certificate preferably from CPRI [Central Power Research Institute, Ministry of Power, Govt. of India, Bangalore] or ERDA [Electrical Research and Development Association, Mumbai] Laboratory or any other NABL accredited Laboratory for the offered Instrument is mandatory.

**7. Demonstration :**During Technical scrutiny of the bid, purchaser will ask to demonstrate the offered Instrument and requisite accessories at DTD laboratory. The Bidder shall have to demonstrate the test Instrument within 15 days of intimation from the purchaser. It is the responsibility of the bidder to bring all the Instruments with necessary software and accessories required to show the performance of the test set as per Technical Specification at date and time communicated to them in advance. The bidders are also required to provide the operating manual /required literature and sent competent Engineers at that. The purchaser will evaluate the suitability of product of their application. The purchaser decisions will be final and unchanged for acceptance/ not-acceptance of product even, if the product will be comply other tender terms. If is bidder's responsibility to arrange the demonstration with all necessitate at DTD laboratory

8. **Performance Certificate**: Bidder shall submit at least two Performance certificate from any power utility/ Govt. Department for Instruments supplied during last 5 (five) years from date of Tender to be submitted with the Offer. The date of performance certificate should be at least after one year from the date of delivery. Documentary evidence for the supply & acceptance of quantity by the Consignee Authority to be submitted with the offer

9. Financial **Eligibility**: The bidder shall have adequate financial capability to the extent of the estimated value of their offer. For the financial eligibility of the bidder, pro-rata annualized value of the orders in the bidder's hand corresponding to the contract period of this tender along with the estimated value of the offer of the bidder should not exceed 150 % of their Average Annual Turnover of the last three completed financial year

10. **Maintenance and support**: Bidders must give necessary service and spare part support for the entire life time of the Testing Instruments offered after completion of the Guarantee period as and when required.

## Technical Particulars of Transformer 3-Phase Turns Ratio meter

| Sl no | Description | Required Specifications |
|---|---|---|
| 3 | Reference Standard | As per relevant IEC/IS Standard |
| 4 | General | a) Fully Automatic Digital Turns Ratio meter – the instrument should be suitable for Automatic measurement of Turns Ratio, Phase Angle Displacement of CT, PT, single phase and Three Phase Transformers<br>b) One Time Connection to Transformer for measuring Ratio Error and phase angle displacement error of three phase and single phase transformers. It should have facility to indication for wrong connection<br>c) The display shall at least indicate the Ratio Error in % and ,phase angle displacement error in minutes-cent-radian<br>d) Instrument and accessories should be housed in cabinet to be portable.<br>e) Instrument should have trouble free operation in charged switchyard under |
| 5 | Measurement Range | Ratio : 0.9 to 999.9:1 in three ranges or better<br>Phase Angle ±90 degree |
| 6 | Measuring Voltage | 50 Volt or better in steps |
| 7 | Accuracy | < 1% or better |
| 8 | Measuring Channels | 1 no or better |
| 9 | Power Supply | 230 V AC ± 10%, 50 Hz ,single phase |
| 10 | Measuring Time | a) Initial Reading within 2 second<br>b) Stability of reading not more than 15 seconds |
| 11 | Data Storage | Provision for storing minimum 100 measurements internal memory of the kit or better |
| 12 | Interface | USB and RS232 interface |
| 13 | Safety | International safety standard which are applicable as per the product |
| 14 | Operating Condition | 1. Operating Temperature upto 50˚C<br>2. Humidity 0-90% RH(max), non-condensing<br>3. Instrument should have trouble free operation in charged switchyard under electrostatic and magnetic interference conditions |
| 15 | Housing | Rugged case and should be portable |
| 16 | Software for Data Downloader and Report Generation | Latest version of software to be provided with the instrument if any |

| | | |
|---|---|---|
| 17 | Accessories | a) Test lead should be 15 meter length with large size crocodile clamp . Additional spare Test lead should be delivered against each instrument.<br>b) Separate heavy duty plastic moulded transport case with soft padded for each unit for field testing activities -01 No<br>c) Separate bag for accessories -01 No<br>d) Suitable software for data logging storage and analysis of measured data<br>e) All interfacing cables two sets each<br>f) Maintenance4 and operation manual in English with detail Test procedure 02 sets each<br>g) Power cord, 5 meter Earthing cable, Instruction Manual Hard copy, USB etc |

## Technical Particulars of 3-Phase Transformer Winding Resistance meter

| Sl no | Description | Required Specifications |
|---|---|---|
| 1. | Manufactures name & address | |
| 2 | Manufacturers Type and Model no | |
| 3 | Reference Standard | As per relevant IEC/IS Standard |
| 4 | General | a) Fully Automatic Digital Resistance meter – the instrument should be suitable for Automatic measurement of Winding Resistance(CT, PT, motor, Generator single phase and Three Phase Transformers<br>b) The Instrument should use classic Kelvin's 4-wire method to measure resistance so that need of lead resistance compensation is eliminated<br>c) Digital direct reading ,microprocessor based ohmmeter to be used for DC resistance measurements for transformers and Electrical devices with high inductance to allow quick measurement<br>d) The display shall at least indicate % of current activity . Date & time ,selected current range and resistance values.<br>e) Instrument should be housed in cabinet and should be portable<br>f) It should check for any discontinuity in tap changer while changing from on tap to another<br>g) It should have protection against the back emf offered by large transformer consisting of very fast discharge time and should be able to display % current stability. |
| 5 | Measurement Range | 1 μΩ [ Micro ohm]to 2 KΩ [kilo ohm] Auto/manual Range Selection of better |
| 6 | Measuring Channels | 02 Nos |
| 7 | Power Supply | 230 V AC ± 10%, 50 Hz ,single phase |
| 8 | Accuracy | < 1% of reading or better |
| 9 | Resolution | 0.1 μΩ [ Micro ohm] and 5 digit or better |
| 10 | Current Range | Current should be minimum 10mA to 10A or better. User selectable (smaller current for small transformers & CT PT so As to avoid heating the Winding & Higher current for high inductive loads) |
| 11 | Max. Test Current | 10 A , DC or more |
| 12 | Output Voltage (Open Circuit Voltage) | 25 V DC (Min) or better |
| 13 | Measuring Time | a) Initial reading within 02 second<br>b) Stability of reading n or more than 15 seconds |

| | | |
|---|---|---|
| | | c) The kit should be able to measure accurate Winding resistance within specified accuracy limit |
| 14 | Data Storage | Provision for storing minimum 100 measurements in internal memory of the kit or better |
| 15 | Interface | USB an d RS232 interface |
| 16 | Safety | International safety standard which are applicable as per the product |
| 17 | Operating Condition | 1. Operating Temperature upto 50˚C<br>2. Humidity 0-90% RH(max), non-condensing<br>3. Instrument should have trouble free operation in charged switchyard under electrostatic and magnetic interference conditions |
| 18 | Magnetization | Quick magnetic loading for fast and reliable measurements |
| 19 | Demagnetization | Built in auto demagnetization circuitry for demagnetization of the specimen |
| 20 | Discharge Current | Built –in-discharge circuits for safe & fast discharging of the specimen |
| 21 | OLTC Operation | It should be checked for any discontinuity in tap changer while changing the tap from one position to another |
| 22 | Housing | Rugged case and should be portable |
| 23 | Weight | Approx 10 kg for instruments and total 15kg with cable |
| 24 | Software for Data Downloader and Report Generation | Latest version of software to be provided with the instrument if any |
| 25 | Accessories | a) Test lead should be 15meter length with large size crocodile clamp. Additional spare Test lead should be delivered against each instrument<br>b) Clamp diameter should be more than 50 mm<br>c) Separate rugged heavy duy plastic moulded transport cast with soft padded for each unit for filed testing activities -01 No<br>d) Separate bag for accessories-+01 No<br>e) Suitable software for data logging storage and analysis of measured data<br>f) All interfacing cables two sets each<br>g) Maintenance4 and operation manual in English with detail Test procedure 02 sets each<br>h) Power cord , 5 meter Earthing cable, Instruction Manual Hard copy, USB etc |

## Technical Specification of OTI & WTI Test Set

1. Constant Temperature Thermal Bath
   Size (Inner Chamber ) 15 inch(L) X 7 inch(B) X 3 inch(H)
2. Inner Chamber should be made of Stainless Steel and the outer side made of mild steel with spray paint with blanket gloss wood insulation between two walls.
3. No of Temperature Sensor [Instrument Thermometer OTI, WTI] - 10 No
4. Temperature range 5˚C above ambient to 200˚C- Temperature controlled by Microprocessor based dual digital display controller –cum-indicator and solid state relay, motorized stirred for maintaining uniform temperature throughout the bath, fitted with metal "U" tube with inlet/outlet tube for coolant flow.
5. Bids will be accepted only after meeting the technical requirement as per specification on site- demonstration

## Technical Specification of CT Analyser

## 1. SCOPE OF WORK

The Specification covers the design, manufacturing , supply , delivery ,erection and commissioning of fully automatic multi tap (suitable for at least 3 tap) up to the level of at least 33 kV CT Analyser..Supply and delivery of Laptop (with each lit) necessary to run the test kit is also on bidder's scope . All necessary driving software for CT Analyser including product support software, MS Office, Antivirus of Associated Laptop has to be supplied in CD form separately for each Test kit/Laptop.

## 2. PURPOSE

The CT Analyser is used for measurements of CT ratio and phase angle accuracy, polarity, CT winding resistance ,CT excitation /saturation (unsaturated and saturated) , knee point , demagnetization, Burden impedance , CT residual magnetism. Automatically calculates ratio errors, saturation curves and knee points. It is microprocessor controlled variable voltage and current output and precision instrumentation for automatically testing single and multi-ratio CTs of Metering. Protection and PS class , reducing testing time and increasing productivity.

## 3. Qualification Requirement (QR)

The manufacture must have designed , manufactured , tested and supplied at least five(5) sets if similar or high end CT Analyser to WBSEDCL/other Power Utilities/ other Government Departments in earlier occasions within test three financial years as mentioned below

a) Purchase Orders, Inspection Offer letter, Despatch instructions, Signed Challan etc for completing supply of the item against particular contract..
b) Successful Type Test Report carried out at NABL accredited Laboratory in India or equivalent international laboratories. The Type Test Report carried out on similar type of model which is going to be offered.
c) Performance Certificate from other Power utilities / other Government Departments where the Test kit was supplied within last Three years. If the bidder can submit the credential of the offered set from Power Utilities or Government Departments supplied through Channel partners those certificates will also be acceptable
In both cases offered set means sets with same model no as those of offered ones
d) Vendor should be OEM only.

Bidder should have fully equipped technical support office/laboratory having facilities for testing , calibration, diagnosis and repair of Instrument in India itself. Bidder should have technical staff permanently posted in India for technical support after sale. List of Plant and Machinery, tools and tackles to carry out service shall be submitted along with offer. Statements of order executed for similar item during last three financial years.

## 4. SPECIFICATION

| Sl no | WBSEDCL requirement |
|---|---|
| 1 | Instrument should be able to perform following test manually and automatically |
| 1.1 | Ratio<br>Accuracy |

| | | | |
|---|---|---|---|
| | ratio | 1…….2000 | 0.02% |
| | ratio | 2000…….5000 | 0.03% |
| | ratio | 5000…….10000 | 0.05% |
| 1.2 | Saturation Test<br>The saturation test can be performed at frequency of 50 Hz upto 2000 Volts as required by IEC regulations it should calculate the rated knee point | | |
| 1.3 | Phase measurement<br>3 Digits<br>Range 0 to 360 ˚(Degree)<br>Resolution 1 min<br>Accuracy :- +/- 1 min (typical)<br>+/- 6 min ( Max) | | |
| 1.4 | CT winding resistance measurement (primary and secondary)<br>Accuracy ( at 20˚ C ) ± 1% , 0 to 30Ω resolution 1 mΩ | | |
| 1.5 | CT excitation curve<br>The CT Analyser measures the excitation curve and determine the knee point and other important CT data . Depending on the value of the knee point voltage the CT Analyser identifies the test object as either a measurement CT or a protection CT | | |
| 1.6 | Polarity Check | | |
| 1.7 | Secondary Burden measurement:<br>The Burden Test Card allows the measurement of a current Transformers secondary burden by injection AC current into the load ( upto 5 A) | | |
| 1.8 | Knee point voltage<br>Upto 5 kV can be measured | | |
| 2 | The Instrument must have the following features : | | |
| 2.1 | Automatic demagnetization of the CT after the test : System can be automatically demagnetized the CT under test | | |
| 2.2 | Power Supply<br>Input Voltage : 230 V ± 10% ; 50 Hz:; 15 A (Max) | | |
| 2.3 | Display :<br>Full colour high resolution LCD | | |
| 2.4 | Environment conditions:<br>Operating Temperature :- -10˚C ……+50˚C/ 14˚F…….122˚F | | |

| | |
|---|---|
| 2.5 | Automatic assessment according to IEEE C57.13 . IEC 60044-1 or 60044-6 |
| 2.6 | Remote Control interface:<br>Full access to all functions to the CT Analyser via a Laptop with software, Software shall be provided on free of cost basis. It shall have the facility to export date from testing set to laptop through date cable in non-editable format (PDF) . Customizable report and storing. Data cable should be of suitable length |
| 2.7 | Data handling and recording :<br>Test reports can be saved /stored on the compact flash card and transferred to a PC. Data and protocols can be shown on a PC via the Excel TM file loader program, customizable reports templates shall be available for different standards , Classes and Applications, Single , multi core and multi tap CT's . Three phase testing, Core Testing |
| 2.8 | Weight<br>Volume of product should be less than 0.025 $m^3$ and weight less than 20 kg otherwise suitable trolley of plastic body with stainless steel shall be supplied by supplier on free of cost basis |
| 2.9 | Safety :<br>As per standard EN60950 and EN61010 |
| 3.0 | Suitable lead of 10 length for testing of current transformer by CT analyser to be supplied along CT analyser |
| 3.1 | The CT Analyser shall have option to be operated both manually as well as through laptop, |

## 5. Technical Specification of Laptop computer (should be from known reputed brand)

1. System Feature
   - **a)** Operating System : Windows 7/8 professional
   - **b)** Processor : I7 , 2.5 GHz ; Brand Intel
   - **c)** Chipset Mobile HM 76 Express
   - **d)** Cache 3MB or higher
2. Memory
   - **a)** System Memory : 8GB DDR 3 or higher
3. Storage
   - **a)** Hard drive s space : At least 500 GB or higher , 7200 rpm
4. Display
   - **a)** Screen size 15.6 inch with LED backlit display
   - **b)** Resolution 1366 X 768 pixel
   - **c)** Graphic : High Definition Display
5. Optical Drive Super Multi DVD RW with dual Layer support

6. Port
   - a) 2 X USB 2.0 port , 2 X USB 3.0 port
   - b) At least 1 RJ45
   - c) RS232 port ( 9 pin serial) / External USB to serial MOXA convertor
7. Input Device
   - a) Pointer Devoice : Touch pad
   - b) Keyboard : Full size keyboard with numeric keypad
   - c) Webcam
8. Audio integrated digital microphone with speaker
9. Network interface
   Ethernet , wireless LAN, Bluetooth
10. Dimension and weight
    Should be light weight and portable
11. Power Supply
    - a) 230 V AC, 50 Hz, 90 W ( not more than ) AC Adaptor
    - b) Battery Back up : At least 3 hours
12. Software CD
    - a) Product Support software
    - b) MS Office Standard
    - c) Reputed brand Anti-virus software with three years validity

13. Carry Case : Free with Laptop

## 6. DEFECT LIABILITY

- a) All the Instruments supplied against this specification shall be guaranteed for a defect liability of 60 months from the date of receipt at DTD store duly passed acceptance testing at DTD lab after delivery
- b) Any Engineering error , omission, wrong provision, Instrument failure etc , the Instrument shall be attended by the bidder at free of cost during the defect liability period
- c) For any defect in the kit during the defect liability period repairing ha to be completed within 15 days. Otherwise substitute set of same type has to be provided within 15 days from the date of reporting .It will be handed back to supplier on repair and receipt of original set
- d) If any defect observed during defect liability period it is bidders responsibility to collect kit from site / consignee to attend the same
- e) On each failure of Test set the supplier shall submit detailed report of failure analysis to Distribution Testing Department, WBSEDCL
- f) Necessary Life time licensed copy of interfacing and analysis software with test kit should be supplied free of cost with test Instrument

## 7. DEMONSTRATRION :

During Technical scrutiny of the bid, purchaser will ask to demonstrate the offered Instrument and requisite accessories at DTD laboratory. The Bidder shall have to demonstrate the test Instrument within 15 days of intimation from the purchaser. It is the responsibility of the bidder to bring all the Instruments with necessary software and accessories required to show the

performance of the test set as per Technical Specification at date and time communicated to them in advance. The bidders are also required to provide the operating manual /required literature and sent competent Engineers at that. The purchaser will evaluate the suitability of product of their application. The purchaser decisions will be final and unchanged for acceptance/ not-acceptance of product even, if the product will be comply other tender terms. If is bidder's responsibility to arrange the demonstration with all necessitate at DTD laboratory

## 8. ACCESSORIES:

Sufficient quantity of connecting leads ( properly socket – terminated at both ends) for all voltage, current and binary input/outputs each of length at least 2 m long , Input {Power cable and other relevant accessories required for 'CT Analyser and the 'Laptop with printer'. The laptop shall be of reputed make i,e HCL,HP, Toshiba, Lenavo. The printer shall be of LaserJet Type

9. **LITERATURE AND TECHNICAL MANUAL**: The manufacturer is to provide at least two sets of Literature and Technical Manual per set.

## 10. TYPE TEST:-

The Test Set shall be Type Tested for EMI,EMC & Degree of Protection for IP S4 conducted from third party NABL accredited Laboratory or Government Departments within last 05(Five) years.

## 11. :COMMISSIONING

The supplier shall have to commission the Instrument at consignee' premises as desired by the consignee. Necessary Standard Tests shall be done at the consignee's premises during the commissioning of the Instrument. The consignee's staff shall be trained by the manufacturer' s Engineer for satisfactory operation , maintenance and trouble shooting upto their full satisfaction

## Technical Specification of 0-80 KV, AC HV TEST KIT

## 1. INTRODUCTION:

The utility of this will be for the testing of applied voltage test on CT, PT, Transformers, Motors, Insulators etc .at various stages of manufacturing and /or erection at different applied voltages.

## 2. TECHNICAL DATA

1. Input supply : 0-230 V± 10% volts, 1 Phase, 50 ± 5% Hz, AC supply.
2. Output voltage : Continuously variable 0 to 80 KV AC.
3. Capacity : 100mA in 0-80 KV range
4. Duty Cycle : 5 min On, 10 min Off.
5. Accuracy of TR. : ±3 % or better
6. Accuracy of Ammeter, Voltmeter : ±1 % or better
7. Percentage Impedance : not more than 8% in any case.
8. Output voltage variation : By means of motor driven arrangement.

- Over load Tripping adjustment: At 10 mA, 20mA, 50 mA and 100 mA AC.
- Over Voltage Indication & Interlock Protection provided.
- Over Load Tripping set at 50 mA

## 3. FEATURES OF 0-80 KV, AC HV TEST KIT

The Instrument must be in two main units to be provided with wheels for easy movement as described below :

### 1. Control and Metering unit :

It should consists of main input fuses, MCB, contactor fuses, supply indication lamps, push buttons, timers, automatic overload tripping circuits 'EMERGENCY OFF' push button., meters etc. housed in a robust cabinet with adequate ventilation and should have good aesthetic appearance. Digital meters of reputed make for indication as well as for measurement are preferred over analog. The cables/ wiring to be terminated on suitable terminal blocks with crimped lugs and ferrule nos. Gland plate should be provided at the bottom or rear side for cable entry. The whole control circuitry will be housed within a sheet metal cabinet treated properly and powder coated. Continuously variable autotransformer (Rated to operate on 0-230 V, 50 Hz) of suitable capacity to increase/decrease the output test voltage up to the required voltage level. INCREASE/DECREASE circuit to control motor operated Voltage Regulator. The continuously variable auto transformer shall be natural air-cooled.

When high voltage circuit is switched ON the regulator will rotate to increase the output voltage when INCREASE / DECREASE switch is kept in 'INCREASE' position and 'INCREASE' push is pressed ON or decrease the output voltage when the 'INCREASE/ DECREASE' switch is kept in 'DECREASE' position.

### a) Protection& Interlock:

- Enclosure interlocking will be provided i.e. high voltage circuit cannot be energized unless the door of the enclosure is closed. However, this interlock can be by-passed by shorting corresponding terminals. Zero start interlocking will be provided to ensure that the HV circuit cannot be energized unless the regulator is initially kept or brought back to zero position.
- Automatic tripping mechanism for protecting the HV transformer against over loading. The tripping mechanism can be adjusted at values as mentioned above. After tripping, High Voltage will be switched OFF.
- In case the output voltage crosses the maximum rated value a lamp & a buzzer will indicate overvoltage and the increase mode circuit will not function further, even if 'PRESS TO INCREASE' push is pressed.

The instruments for indications and measurements include following :

Voltmeter : Digital Voltmeter generally connected to the tertiary winding of HV Transformer for measurement and scaled in KV. Resolution: 0.1KV.

Ammeter : Digital milliammeter along with 'PRESS TO READ mA' push to read the leakage current at HT side. Resolution: 0.1mA.

kV Meter :For output voltage measurement

Timer : A 'TIMER' (0-999secs.) with start switch will be provided to count down the duration of applied HV. After completion of the test time the regulator will automatically decrease to zero position. 'RESET' feature of the 'TIMER' will be provided.

## 2. High voltage transformer :

- Oil cooled step up transformer specially designed to cater HV breakdown applications.
- The HV winding of the Transformer is of graded insulation; one end being connected to the earth potential through a CT operated Ammeter & tripping device, while the other end remains in floating condition as HT Terminal.
- The transformer will be designed to withstand frequent intermittent spark over or short circuit conditions under which such testing transformers are designed to operate.
- HT terminal will be provided with anti-corona metallic ring of adequate diameter to facilitate uniform charge distribution.

**a)** Core: The core of the transformer will be of high grade CRGO steel of M4, M3 or M2 Hgrade material only.

**b)** Coils : The coils will be made of 99.99 % pure electrolytic copper conductor with suitable insulation between turns and layers. The primary and secondary coils will be of round shapes so as to withstand mechanical stress during short circuit and during normal operation.

**c)** Wiring : The wiring will be carried out with suitable cross section multi strand copper conductor. The cable should be terminated with ferrule and crimped lugs on both the ends. The bunch of wire be neatly laid out and secured to the body cabinet with button tape.

**d)** HV point to be brought out with suitable porcelain insulator and should have isolated LV point brought out on the top of body to assist tan delta measurement with existing Instrument

**e)** .The HV and LV Bushing shall be of porcelain and of reputed make and the HV Bushing shall be of adequate voltage to withstand 80 kV. The HV side bushing shall of 1.1 kV Class.

## 4. Qualifying Criteria

Only OEM of the item can apply. The manufacture must have designed , manufactured , tested and supplied at least five(5) sets if similar or high end 0-80 KV, AC HV Test Set to WBSEDCL/other Power Utilities/ other Government Departments in earlier occasions within last three financial years as mentioned below. Document in support of Supply

e) Purchase Orders, Inspection Offer letter, Despatch instructions, Signed Challan etc for completing supply of the item against particular contract..

f) Successful Type Test Report carried out at NABL accredited Laboratory in India or equivalent international laboratories. The Type Test Report carried out on similar type of model which is going to be offered.

g) Performance Certificate from other Power utilities / other Government Departments where the Test kit was supplied within last Three years.

If the bidder can submit the credential of the offered set from Power Utilities or Government Departments supplied through Channel partners those certificates will also be acceptable In both cases offered set means sets with same model no as those of offered ones

## 5. DEGREE OF PROTECTION IP53

## 6. TYPE TEST

The High Voltage PT shall be Type Tested from Third Party NABL accredited Laboratory or from equivalent Laboratory of International repute for degree of Protection IP53. Those Test are to be conducted within last 05(Five) years.

## 7. CABLES

### 1. Primary cable:

Primary cables should be 3 core and Minimum 20 Meters long suitable for connection to 230 ± 10% volts, 50 ± 5% Hz AC supply. 1100 V grade cable to be used.

## 8. Max. Dimension of unit (L x B x H) to be furnished with the offer.

## 9. Net weight with GA drawing to be furnished with the offer.

## 10. PAINTING:

HV test Instrument shall be powder coated outside with epoxy paint light gray RAL-7035 and inside with white epoxy paint and all bright steel components shall be coated with rust preventive paint before dispatch.

## 11. TEST AND INSPECTION

- Supplier to submit his QA plan along with offer.

- Testing shall be done as per relevant standards. Inspection will be done at supplier's works by WBSEDCL representative. Internal testing and QC reports along with one copy instruction manual shall be furnished for WBSEDCL's approval before giving call for inspection.
- Supplier should have all the facility to conduct the following basic tests:-

1. No-load current of the Auto Transformer
2. Insulation Test of HV Transformer
3. No .load ant Load Test on Continuously variable Auto Transformer
4. Terns Ratio (% Error) measurement of the PT.

The supplier should submit with offer, the testing scheme together with Line Diagram for all the test required on the above H.V. Tester.

## 12. INSTRUCTION MANUAL:

The instructional manual shall consists of following sections. The instruction manual shall be made on good quality paper (at least 90 gsm) and shall be made in bound volumes (6 copies) suitable for long term usage in shop/site.

- Introduction.
- Photograph of all items of Instrument
- Description of equipment, GA drawings, Schematic diagram/ Circuit diagrams.
- Test certificate.
- Detailed procedure to operate the Instrument
  (written in easy language for understanding of operators)
- Do's and Dont's, FAQ(Frequently asked Questions ) and Answers
- Trouble shooting flow chart.
- Service centre contact details like address, email address, phone nos, cell nos. etc.

## 13. GUARANTEE:

a) All the Instruments supplied against this specification shall be guaranteed for a defect liability period of 60months from the date of receive at DTD store duly passed acceptance testing g at DTD Lab after delivery.
b) Any Engineering error , omission , wrong provision , Instrument failure etc. The Instrument shall be attended by the bidder at free of cost during defect liability period.
c) For any defect in the High Voltage Test set during defect liability period repairing has to be completed within fifteen days otherwise substitute set of same type has to be provided within fifteen days from the date of reporting. It will be handed over back to supplier on repair and receipt of original set
d) If any defect observed during defect liability period it is bidders responsibility to collect kit from the site /consignee to attend the same
e) On each failure of Test set the supplier shall submit detailed report of failure analysis to

## 14. DOCUMENTATION:

-1 set complete with drawings/leaflets/catalogue and technical information giving full description, operation, dimensions, weight etc. along with offer.

## 15. COMPLETENESS OF OFFER:

Supplier to confirm compliance of specifications first instance itself. Any deviation shall be clearly brought out in the of

## Technical Specification of Vacuum Interrupter Tester

The Vacuum Interrupter Tester to check quality of Vacuum Interrupter of 33 kV & 11 kV VCB . The kit should be rugged & portable with light weight up to 10 kg or less with easy to operate functions.

**Climatic Conditions:** The High Voltage Test Kit should be suitable for satisfactory operation under the following environmental conditions.

- Operating Temperature : 10˚C to 60˚C
- Storage Temperature -30˚C to 70˚C
- Relative Humidity :- 910% RH Non-condensing

### General Specification:

- The test kit should display Test Voltage, Leakage Current and Pass/Fail indication for each unit
- The kit should have discharge facility Maximum discharge time for internal high voltage should not be more than 5 sec.
- The kit & accessories should comply internationals standards
- The instrument should have CAT-IV , 600n V facilitate.
- The manufacturer should have Service Centre in India.
- Conformity Standard : IEC61010.IEC61326

### Technical Specification:

1. Input Power 2 Amps, 100 to 250 Volts, 50 Hz
2. Output Voltage : 0-75 KV , DC in 01 kV Step, Accuracy±1.5% or better
3. Ripple in Output Voltage : 03% max
4. Leakage Current Measurement {0-100µA-200µA-300µA with different selectable tripping range
5. Instrument Display : LCD Display with backlit containing applied voltage ,leakage current and pass or fail indication.
6. Keypad. Rugged membrane keypad with minimum 10 alpha –Numeric Keys and 6 functional keys.
7. PC Communication : Pc interface with USB or RS2312 . Windows based software to be included .
8. Memory : The kit should have internal memory for more than 50 Test Results or better.
9. Printer : Built-in-printer should be provided

### Protection

1) The kit should have thermal & Overload Protection which can prevent damages to internal circuit of the kit.
2) Emergency stop should be provided with the kit for safety.

### Accessories

- 10 Mtr High Voltage Cable
- 10 Mtr High Voltage Return Cable
- 10 Mtr Cable for Grounding
- Power cord
- Software CD
- USB/RS232 Interface cable
- User Manual Soft Copy & Hard Copy
- Calibration Certificate from NABL Accredited Laboratory
- Carrying Bag for Instrument and Accessories
- One set of spare cable to be supplied along with each set of instrument

## Other Specification

a) The Bidder must have
Supplied at least 5 no kits of similar or higher rating in the last 2 years
b) Bidder must submit the performance certificate of at least 2 customers' who have been using the Instrument for last 2 years
c) Instrument should be calibrated from any NABL accredited Laboratory. Calibration results shall comply with specifications
d) Warranty period 5 years

## Qualifying Requirement

- The bidder must have supplied at least 02 no kits of similar or higher rating in the last 02 years.
- Bidder must submit the performance certificate of at lest Two customers who has been using since last 02 years
- Instruments should be calibrated from any NABL accredited Laboratory. Calibration certificate should bear NABL logo in each page. Calibration results shall comply with the specifications
- Warranty period 12 months from the date of demonstration of the materials on delivery
Bids will be accepted only after meeting the technical requirement as per specification on site-demonstration

## Technical Specification for Ultrasound Detector

(for Electrical Signal only):

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Construction | Hand-held pistol type made with coated aluminium and ABS plastic with Complete Carrying Case |
| 2 | Circuitry | Solid State SMD Digital Circuitry with temperature compensation and True RMS conversion |
| 3 | Frequency Range | 20 kHz to 100 kHz (tunable in 1 kHz increments) |
| 4 | Response Time | < 10 ms |
| 5 | Display | QVGA Touch Screen-IR, Laser Pointer, Camera, Spectrum Analyser |
| 6 | Sound Recording | WAV file format |
| 7 | IR Temperature | -20$^{O}$C to 500 $^{O}$C |
| 8 | Camera | 2.0 Mega Pixel |
| 9 | Laser Pointer | Output , 5mW-wavelength 640 nm – Class IIIa Laser Product |
| 10 | Memory | 400 storage locations |
| 11 | Battery | Lithium ION Rechargeable or equivalent |
| 12 | Operating Temperature | 0 $^{o}$C to 50 $^{o}$C |
| 13 | Outputs | Calibrated heterodyned output, decibel (dB) frequency, SD card |
| 14 | Probes | Trisonic Scanning Module and Stethoscope Module, Long Range Module and RAS-MT |
| 15 | Headset | Deluxe noise attenuating headphones for hard hat use |
| 16 | Indicators | dB, Frequency, Battery Status and 16 Segment Bar Graph |
| 17 | Sensitivity | Detects 0.005" (0.127mm) diameter leak @ 5 psi (0.34 bar) at a distance of 50 ft. (15.24 m) |
| 18 | Threshold | 1 X $10^{-2}$ std. cc/sec to 1 X $10^{-3}$ std. cc/sec |
| 19 | Weight | Pistol Unit <1.5 kg |
| 20 | Warranty | 5 years with completed warranty registration card |
| 21 | Display Modes | dB (main), IR, ABCD, Spectrum and Application Specific, Spectrum Analyser (modes): Spectrum, Time Series & Dual Specific |

## Technical Specification for Infrared Thermometer:

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Distance-to-Spot Ratio (D:S) | 30:1 |
| 2 | Range | -30 $^{O}$C to 650 $^{O}$C |
| 3 | Basic Accuracy | 1 $^{O}$C or 1% of reading |
| 4 | Emissivity | Adjustable with 4 presets and custom option |
| 5 | Resolution | 0.1 $^{O}$C |
| 6 | Response | ≤ 150 ms |
| 7 | Special Response | 5.0 – 14 µm |
| 8 | LED Worklight | Bright enough to work in very poor lighting |
| 9 | Ruggedness | Should withstand a three meter drop |

## Technical Specification for Thermal Imaging Camera with High Resolution:

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | IR Resolution | 384 X 288 (110,592 pixels) or more |
| 2 | Thermal sensitivity | < 0.075 °C @ 30 °C |
| 3 | Object Temperature range | - 20 °C to 600 °C |
| 4 | Accuracy | ± 2 °C or ± 2% of reading |
| 5 | Image Frequency | 30Hz |
| 6 | Field of view (FOV) | 24° X 18°(18 mm lens),<br>42° X 32° (10 mm lens) |
| 7 | Lens identification | Automatic |
| 8 | Focus | Continuous {one shot Laser distance meter],<br>{one shot contrast] & Manual ˚ |
| 9 | Image Modes | Infrared, Visual, MSX, Picture-in-Picture |
| 10 | Laser Distance Measurement | Yes, on-screen Distance Measurement Range 40 m or more |
| 11 | Measurement Presets | Centre Spot, Hot Spot, Cold Spot,<br>User Preset 1,<br>User Preset 2. |
| 12 | Spotmeter | 3 in live mode |
| 13 | Area Box | 1 in live mode |
| 14 | Compass, GPS | Yes, Automatic GPS image tagging |
| 15 | Image File Format | Standard radiometric JPEG, measurement data included |
| 16 | Video recording | Real time radiometric recording(.csq);<br>non-radiometric H.264 recording to memory card |
| 17 | Video Streaming | Radiometric streaming over UVC or Wi-Fi;<br>Non-radiometric H.264 or MPEG-4 over Wi-Fi |
| 18 | Communication interface | USB 2.0, Bluetooth, Wi-Fi, Display Port |
| 19 | Lens required | Standard and Wide Angle |
| 20 | Alarm | Camera should have facility to user preset Temperature Colour Alarm as well as audible Alarm for high and low Temperature |
| 21 | Warranty | 2 years for Camera<br>5 years for Infra red Detector |

## Technical Specification for High Voltage Test set up to 5 kV.

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Voltage Output | 5 kV |
| 2 | Tripping Current selectable at 25%-50%-100% of full range | [50/ 100 mA]<br>Full range 100 mA |
| 3 | Burden | 0.25 kVA at 50 mA / 0.5 kVA at 100 mA |
| 4 | Voltage Type | AC |
| 5 | Display Type (Voltage/Current) | Digital |
| 6 | Accuracy of Voltage | ± 2% |
| 7 | Accuracy of Current | ± 2% |
| 8 | Voltage Resolution | 0.1 kV |
| 9 | Current Resolution | 0.1 mA |
| 10 | Supply | 230 V AC, 50 Hz, 1 Phase |
| 11 | Duty Cycle | 15 min on, 10 min off |
| 12 | Timer | 0.999 seconds of FS |
| 13 | Timer Accuracy | ± 0.05% |
| 14 | Operation | Manual/Motorised |
| 15 | Cooling Type | Air Cooled |
| 16 | Indication | LED for Power On & Test On |
| 17 | Protection | MCB, HRC Fuse, Zero Start interlock, Earth open interlock |
| 18 | Operating Temperature | 0-55 $^{o}$C, 5-90% RH Non Condensing |
| 19 | Accessories | Interconnecting cable, Grounding Cable, Instruction Manual, Warranty Certificate, Calibration Certificate, Mains Cord, HT Cable, Spare Fuse, Discharge Rod |

## Technical Specification for Regulated DC Power Supply up to 300 V:

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Input | 230V AC ±10%, 50Hz single phase, output protected against short circuit |
| 2 | Output Voltage | 15-300V |
| 3 | Output Current | 5.00A |
| 4 | Metering | 3 and ¾ digit Digital Panel Meter to indicate voltage & current simultaneously |
| 5 | Regulation | Line : ± 0.1%., Load : ±0.1%. |
| 6 | Ripple & Noise | 0.05% rms |
| 7 | Operating Temperature | 0-50 $^{o}$C. |
| 8 | Protection | Should provide overload protection against short circuits with accessible reset arrangement { User Reset of overload to be provided } |

## Technical Specification of Primary Injection Set upto 600A:

- **Scope:** Primary Injection Set or Current Source to check the CT Ratio. The kit should be rugged & portable with light weight up to 22 KG or less and total volume of 1.5 cubic foot or less with easy to operate functions.

- **Climatic Conditions:** The Test Kit should be suitable for satisfactory operation under the following environmental conditions.
  - Operating Temperature: -10°C to 50°C.
  - Storage Temperature:-30°C to 70°C
  - Relative Humidity:<90% RH, Non-Condensing.
- **General Specification:**
  - The kit & accessories should comply international standards
  - The instrument should have CAT-IV, 600 V facilitate.
  - The manufacturer should have Service Centre in India.
  - The instrument should be designed to meet relevant safety guideline as per IEC61010, IEC61326 or relevant IS.
- **Technical Specification:**
  1. Input Supply: 120 V to 240 Volts AC, 50Hz.
  2. Output current range: 0 - 600 A (Variable).
  3. VA Capacity: 4.5 KVA max.
  4. Internal Meter range: 100 mA to 1000 A, Accuracy: 1% of reading.
  5. External Meter range: 10 mA to 10 A, Accuracy: 1% of Reading.
  6. Measurement Method: Isolated CT.
  7. Timer Reading range: 1 m Sec to 2 Hours, Accuracy: 0.1% of Reading.
  8. Timer Stop Input: Voltage Input (24 V to 300 V DC or Peak AC), dry contact input, or removal of primary current.
  9. Instrument Display: LCD Display with backlit minimum containing applied current, secondary current & time.
  10. PC Communication: PC interface with USB or RS232C. Windows based software to be included.
  11. Auto cut-off upon tripping relay [ CT Ratio/Polarity/Phase Angle Measurement]
- **Accessories:**
  - 02 Nos. 10 Mtr.Cable capable to carry 600 A. . Additional spare set of cables to be supplied along with the set
  - 10 Mtr. Cable for grounding.
  - Power Cord
  - Software CD
  - USB/RS232 Interface cable
  - User Manual Soft Copy & Hard Copy.
  - Calibration Certificate from NABL Accredited Laboratory.
  - Carrying Bag for instrument and accessories..

## Technical Specification of Primary Injection Set upto 200A:

- **Scope:** Primary Injection Set or Current Source to check the CT Ratio.The kit should be rugged & portable with light weight up to 22 KG or less and total volume of 1.5 cubic foot or less with easy to operate functions.
- **Climatic Conditions:** The Test Kit should be suitable for satisfactory operation under the following environmental conditions.
  - Operating Temperature: -10°C to 50°C.
  - Storage Temperature:-30°C to 70°C
  - Relative Humidity:<90% RH, Non-Condensing.
- **General Specification:**
  - The kit & accessories should comply international standards
  - The instrument should have CAT-IV, 600 V facilitate.
  - The manufacturer should have Service Centre in India.
  - The instrument should be designed to meet relevant safety guideline as per IEC61010, IEC61326 or relevant IS.
- **Technical Specification:**
  12. Input Supply: 120 V to 240 Volts AC, 50Hz.
  13. Output current range: 0 - 200 A (Variable).
  14. VA Capacity: 1 KVA max.
  15. Internal Meter range: 100 mA to 500 A, Accuracy: 1% of reading.
  16. External Meter range: 10 mA to 10 A, Accuracy: 1% of Reading.
  17. Measurement Method: Isolated CT.
  18. Timer Reading range: 1 m Sec to 2 Hours, Accuracy: 0.1% of Reading.
  19. Timer Stop Input: Voltage Input (24 V to 300 V DC or Peak AC), dry contact input, or removal of primary current.
  20. Instrument Display: LCD Display with backlit minimum containing applied current, secondary current & time.
  21. PC Communication: PC interface with USB or RS232C. Windows based software to be included.
  22. Auto cut-off upon tripping relay [ CT Ratio/Polarity/Phase Angle Measurement]
- **Accessories:**
  - 02 Nos. 10 Mtr.Cable capable to carry 200 A. . Additional spare set of cables to be supplied along with the set
  - 10 Mtr. Cable for grounding.
  - Power Cord
  - Software CD
  - USB/RS232 Interface cable
  - User Manual Soft Copy & Hard Copy.
  - Calibration Certificate from NABL Accredited Laboratory.
  - Carrying Bag for instrument and accessories.

## Technical Specification for Secondary Injection Set:

| Sl. No. | Specification | Description |
|---|---|---|
| | **Main generator:** | |
| 1 | Current Ranges | 10, 40, 100 A |
| 2 | Output power | 800 VA |
| 3 | AC voltage range | 250 V |
| 4 | Output power | 500 VA |
| 5 | DC voltage range | 300 V |
| 6 | Output power | 300 W |
| | **Auxiliary AC voltage :** | |
| 7 | Output ranges | 65 – 130 - 260 V. |
| 8 | Output power | 30 VA. |
| 9 | Accuracy | 1% of reading ± 0,2% of range. |
| 10 | Frequency range | from 15 Hz to 400 Hz. |
| 11 | Phase shifting | 0° to 360°; |
| 12 | Resolution | 1° |
| 13 | Accuracy | ± 1° ± 1 DIGIT. |
| | **Auxiliary DC voltage:** | |
| 14 | Ranges | 130 V and 240 V |
| 15 | Power | 90 W at full range |
| 16 | Accuracy | 0.5% of reading ± 0,1% of range |
| 17 | Max. currents | 0.9 A @ 130 V and 0.45 A @ 240 V. |
| | **Timer:** | |
| 18 | Inputs | START and STOP |
| 19 | Inputs level | Normal Open or Normal Close |
| 20 | Timer ranges | 9.999 s; 99.99 s; 99999.9 s. |
| 21 | Accuracy | ± 0.005% of value ± 0.01% of range |
| 22 | Maximum input frequency | 10 kHz |
| | **External inputs measurement**: | |
| 23 | Input current ranges | 20 mA or 10 A, AC or DC |
| 24 | Accuracy | DC: 0.5% of reading ± 0,1% of range; AC: 1% of reading ± 0,2% of range. |
| 25 | Maximum input voltage | 600 V, AC or DC. |
| 26 | Accuracy | DC: 0.5% of reading ± 0,1% of range; AC: 1% of reading ± 0,2% of range |
| | **Others:** | |
| 27 | Display | LCD with display of current values of measured quantity viz, Voltage , current [AC/DC] |
| 28 | Interface | USB |
| 29 | Mains supply | 230 V ± 15%; 50-60 Hz. |
| 30 | LED Indicators | Confirming inputs and outputs status |

## Technical Specification of UPS

| Sl. No. | Technical Parameter | Parameter Description | |
|---|---|---|---|
| 1.0 | Type | Single phase, IGBT (based) True Sine wave online UPS | |
| 2.0 | Input | 240 V ± 10% V AC, Single Phase,<br>3-wire (Phase + Neutral + Ground<br>50±5% Hz<br>Power Factor :≥ 0.9 lag | |
| 3.0 | Output | 2.0 KVA<br>230 V ± 10% V AC Single Phase,<br>3-wire (Phase + Neutral + Ground<br>50±5% Hz<br>≤ 0.75 to ≥ 0.95 (lag) | |
| | Voltage Regulation | ≤ ± 2% | |
| 4.0 | Inverter Efficiency | ≥ 85% | |
| 5.0 | Crest Factor | ≥ 3:1 | |
| 6.0 | Output Capability | 110% ≥ 10 minutes<br>125% ≥ 05 minutes<br>150% ≥ 30 seconds | |
| 7.0 | Current Harmonic Distortion (THDI) | ≤ 5% at Full load | |
| 8.0 | Transient Response and Recovery Period | Less Than ± 10% , Voltage Variation at Sudden Application/ Removal of Full Load<br>Rated Voltage shall be Recovered within 500 msec | |
| 9.0 | Bypass Static Switch Transfer/ Retransfer Time | ≤ 10 ms (UPS to static Bypass and vice versa)<br>Maintenance Bypass No Interruption | |
| 10.0 | Battery Charger | Float /Boost Charging mode shall be provided<br>Battery charging Voltage & Current shall be Adjustble<br>Line and Load Regulation ≤ ± 1%<br>Output Ripple ≤3% | |
| 11.0 | Control Switch<br>( MCB /Fuse/ Isolator) | i. Input ON/OFF<br>ii. Output ON/OFF<br>iii. Battery<br>iv. Maintenance Bypass Switch | |
| 12.0 | Protections | UPS shall trip on following Faults<br>i. Input AC under/over Voltage<br>ii. Output overload/ Short Circuit<br>iii. DC under /over Voltage<br>iv. Over Temperature | |
| 13.0 | Indications & Alarms | | |
| 13.1 | LED Indications | • Mains Healthy<br>• UPS healthy<br>• UPS Trouble/Trip | • Output Overload<br>• Load on Battery |
| 13.2 | Alarms<br>Audible for Trouble/Fault) | Mains Fail<br>Charger Fail | Battery Low/ Discharging<br>Output overload |

| | | | |
|---|---|---|---|
| | | DC under /overvoltage | Over Temperature |
| **13.3** | **Metering LCD Display** | Input/Mains Voltage<br>UPS output Voltage<br>UPS Output / Load Current | Charger/Battery Voltage<br>Battery Charging/<br>Discharging current |
| **14.0** | **Environment** | 0-55˚C and 95% RH | |
| **15.0** | **Communication(optional)** | RS232 or others | |

# Analog Insulation Tester: 5 kV

**(Mains Operated Motor Driven)**

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Scale of length | 100 mm (approx.) |
| 2 | Rated Output Voltage | 5 kV |
| 3 | Mains Supply | 230V AC ± 10%, 50Hz ± 5% |
| 4 | Resistance Range | 5GΩ – 100GΩ |
| 5 | Standard | IS: 11994 |
| 6 | Accuracy | As per IS |
| 7 | Ingress Protection | IP 54 |

## Technical Specification of 10 kV Digital Insulation Tester

- **Scope:** 10 kV Digital Insulation Resistance Tester to check quality of Insulation in Electrical Equipments like power Transformer, Current Transformer, Voltage Transformers, cables etc. The kit should be battery operated , rugged and portable with light weight upto 5 kg or less with easy to operate functions

- **Climatic Conditions: High Voltage Test kit should be suitable for satisfactory operation under the following environmental conditions**
  - Operating Temperature : 0-55˚C
  - Storage Temperature: : 0-55˚C
  - Relative Humidity: < 90% RH, Non condensing
- **General Specifications**
  - The test kit should display test voltage, Insulation Resistance, Leakage Current & Capacitance after each Test
  - Kit should have latest Diagnostic modes like IR,PI,DAR,DD and Step Voltage
  - The should have auto discharge facility
  - The kit should be Mains and Battery operated
  - It should have in-built rapid chargeable Li-ion Battery
  - The kit and accessories should comply international standards like IEC-1010-1
  - The instrument should CAT-IV, 600 V facilitate
  - The manufacturer should have Service Centre in India
  - LCD Display with Backlit
  - PC interface with USB or RS232
  - The kit should have internal memory for 100 test results
  - Dedicated Software for Data Transfer and Report Generation with Graphical Analysis
  - Conformity Standard : IEC 61010, IEC 61326
  - Ingress Protection IP65 or latest

- **Technical Specifications**
  1. Diagnostic Modes IR, PI, DAR, DD, Step Voltage Burnt and Breakdown
  2. Test Voltage 250 V DC to 10000 V DC in 25 Volts Step Accuracy ± 5 %
  3. Short Circuit Current 6 mA
  4. Insulation Resistance Range : 10 kΩ to 20 TΩ or better
  5. Accuracy upto 1 TΩ @ ±5%, 1 TΩ to 20 TΩ@ ±20% or better
  6. Leakage Current Measurement 1nA to 6mA or better, Accuracy ±5% or better
  7. Capacitance Measurement 10nF to 50 µF ,Accuracy ±[10% of reading + 5nF]or better
  8. AC/DC Voltage measurement upto 600 Volt AC/DC or better
  9. Timer Selectable Time Range 1 second
  10. to 99 minute 59 second
  11. Power Supply : Main Supply 230V ±10%, 50 Hz, Battery supply Li-ion battery, Battery backup 5 hours of Battery back up at Highest Voltage or better
  12. Guard Terminal should have 2% Error Guiding 5 kΩ leakage with 100 mΩ load
  13. Interference Rejection maximum upto 6 mA or better
- **Protection** The kit should have Thermal and Overload protection which can prevent damages to internal circuit of the kit

- **Accessories**
  - 3 X 15 meter lead set 10 kV rated with heavy duty clamp( Additional Set Of Cables With Clamp To Be Provided Along With each Set)
  - Power cord
  - Software CD
  - USB /RS232 interfacd3e cable
  - User Manual soft copy and hard copy
  - Calibration certificate from NABL accredited laboratory
  - Carrying bag for instrument and accessories

a) The bidder must have supplied at least 5 no of kits of similar or higher rating in the last 02 years
b) The bidder must submit the performance certificate of at least 02 customers who has been using since last 02 years
c) Instrument should be calibrated from any NABL accredited laboratory. Calibration result shall comply with specifications.
d) Warranty period 5 years
e) Bids will be accepted only after meeting the Technical requirement as –per specifications on demonstration

## Technical Specification for Digital Multimeter :

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Type | True RMS |
| 2 | Basic DC Accuracy | ± 0.5% |
| 3 | Measurement of DC Voltage, Accuracy | 60mV -1000V, ± 0.5% |
| 4 | Measurement of AC Voltage, Accuracy | 60mV – 750V, ±1.0% |
| 5 | Measurement of DC Current, Accuracy | 60mA-20A, ±1.0% |
| 6 | Measurement of AC Current, Accuracy | 60mA-20A, ±1.5% |
| 7 | Measurement of Resistance, Accuracy | 600Ω -60MΩ, ±0.5% |
| 8 | Measurement of Frequency, Accuracy | 10Hz-10MHz, ±0.1% |
| 9 | Measurement of Duty Cycle, Accuracy | 0.1%-99.9%, ±0.5% |
| 10 | Measurement of Capacitance, Accuracy | 40nF-4000µF, ±1.5% |
| 11 | Diode/Continuity check | Yes |
| 12 | Update Rate | 3 times /sec |
| 13 | Battery | 9 V |
| 14 | Display | LCD & 3 and ¾ digit display |
| 15 | Backlit | Yes |
| 16 | HV-Probe compatibility | Yes |
| 17 | Safety Category | CAT IV - 600V |
| 18 | IP | IP54 |
| 19 | Transient Protection | 8kV |
| 20 | Overload Protection Voltage range | 1050V DC / AC |
| 21 | Overload/Fuse Protection | Yes |
| 22 | Minimum 1m Test Lead (coloured and paired) Should b provided along with additional spare Test lead | |

## Technical specification for Clamp on Meter :For Measurement of Leakage Current & Load Current

| Sl. No. | Specification | Description | |
|---|---|---|---|
| 1 | Ranges | 0-30mA/300mA | 0-30A/300A |
| 2 | Resolution | 0.01/0.1mA | 0.01/0.1A |
| 3 | Accuracy | ±1.2% of Reading | ±1.2% of Reading for 0-200A<br>±5.0% of Reading for 200-300A |
| 4 | Jaw Size | 50 mm | |
| 5 | System Voltage Limitation | At least up to 300V | |
| 6 | Power Supply | Internally mounted Removable batteries | |
| 7 | Battery Life | Approximately 40 hours | |
| 8 | Low battery & Over Range Indication | Yes | |
| 9 | Auto Power Off | After 10 min | |
| 10 | Withstanding Voltage | Up to 6 kV | |
| 11 | Protection | Overload Protection | |
| 12 | Data Hold Indication | Yes | |
| 13 | Auto/Manual Ranging | Both | |
| 14 | Display | LCD and 3 and ½ digit Display | |
| 15 | Operating Temp | -5$^{O}$C to 55$^{O}$C | |
| 16 | Ingress Protection | IP54 | |
| 17 | Weight | Light Weight | |

## Technical Specification for Accuracy Check Meter :LT & HT

**LT:**

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Current Range | 200mA to 10A (Internal Ring Type CT), 500mA-60A (Clamp-on CT) |
| 2 | Frequency Range | 50Hz ± 5% |
| 3 | Accuracy | 0.2S (Ring Type CT) / 0.5S (Clamp-on CT) |
| 4 | Communication Port | USB |
| 5 | Display | LCD with backlit |
| 6 | Accuracy in Power factor measurement | ± 0.005 |
| 7 | Memory | Internal 16 MB Flash / External 256 MB |
| 8 | Operating Temperature | -10$^{O}$C to 55 $^{O}$C |
| 9 | Humidity | 95% non-condensing |
| 10 | Battery | Rechargeable Li-Ion |
| 11 | Voltage Input(1P) | 240V ± 30% |
| 12 | Protection | IP54 |

**HT:**

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Current Range | 1A to 2A, 5A to 10A (Direct), 100A-500A (Clamp-on CT) |
| 2 | Frequency Range | 50Hz ± 5% |
| 3 | Accuracy | 0.2S (Direct), 0.5S(Clamp-on CT) |
| 4 | Communication Port | USB |
| 5 | Display | LCD with backlit |
| 6 | Power Factor | 0 lagging to Unity to 0 leading |
| 7 | Accuracy in Power factor measurement | ± 0.005 |
| 8 | Memory | Internal 16 MB Flash / External 256 MB |
| 9 | Operating Temperature | -10 $^{O}$C to 55 $^{O}$C |
| 10 | Humidity | 95% non-condensing |
| 11 | Battery | Rechargeable Li-Ion |
| 12 | Voltage Input | 110V(3P3W) ± 30% , 63.5V(3P4W) ± 30% |
| 13 | Protection | IP54 |

## Technical Specification for Digital Timer / Time Interval Tester:

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Trigger Option | START /STOP combination of contact opening / closing & Voltage Application / Removal (AC/DC) |
| 2 | Time range | 0.1 ms to 9999 sec |
| 3 | Resolution | 0.1 ms |
| 4 | Accuracy | ± 0.05% |
| 5 | Power Supply | 230V AC ± 10% , 50 Hz ± 5%, 1 Phase |
| 6 | Display | LCD with backlit |
| 7 | PC connectivity option | RS 232 port |
| 8 | Memory | At least 50 results |

## Technical Specification for Digital Thermometer( with Surface Probe)

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Thermocouple | J,E,T, K-type |
| 2 | Temperature Accuracy above 100 $^{O}$C | ±(0.05% + 0.3 $^{O}$C) |
| 3 | Temperature Accuracy below 100 $^{O}$C | ±(0.20% + 0.3 $^{O}$C) |
| 4 | Operating Temperature | -10 $^{O}$C to 50 $^{O}$C |
| 5 | Storage Temperature | -40 $^{O}$C to 60 $^{O}$C |
| 6 | Humidity | Non-condensing < 10 $^{O}$C<br>95% RH: 10 $^{O}$C to 30 $^{O}$C<br>75% RH: 30 $^{O}$C to 40 $^{O}$C<br>45% RH: 40 $^{O}$C to 50 $^{O}$C |
| 7 | Low battery indication | Required |
| 8 | Time Display :The elapsed Time | Required |
| 9 | Battery | 3 AA batteries |
| 10 | Surface Probe | Yes ( one spare Probe to be supplied along with the materials) |

## Technical Specification of 11 kV Standard PT (3-Phase) with Burden Box

### A) 11 kV Standard PT (3-Phase)

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Voltage Ratio | $\frac{6.6\text{-}11\ kV}{\sqrt{3}} / \frac{110\ V}{\sqrt{3}}$ |
| 2 | Class | 0.1 |
| 3 | Burden | 5VA |
| 4 | Reference Standard | IS: 3156 |
| 5 | Material of PT | Resin Cast |
| 6 | Highest System Voltage | 12 kV |

### B) Burden Box

| Sl no | Specification | Description |
|---|---|---|
| 1 | P T Burden Box Amp | 1 , 5 |
| 2 | Rated Burden | 1.25 to 200 VA |
| 3 | Voltage | 63.5 / 110 Volts |
| 4 | Current | 5 Amp |

## Technical Specification of 33 kV Standard PT (3-Phase) with Burden Box

### A)

| Sl. No. | Specification | Description |
|---|---|---|
| 1 | Voltage Ratio | $\frac{22\text{-}33\ kV}{\sqrt{3}} / \frac{110\ V}{\sqrt{3}}$ |
| 2 | Class | 0.1 |
| 3 | Burden | 5VA |
| 4 | Reference Standard | IS: 3156 |
| 5 | Material of PT | Resin Cast |
| 6 | Highest System Voltage | 36 kV |

### B) Burden Box

| Sl no | Specification | Description |
|---|---|---|
| 1 | P T Burden Box Amp | 1 , 5 |
| 2 | Rated Burden | 1.25 to 200 VA |
| 3 | Voltage | 63.5 / 110 Volts |
| 4 | Current | 5 Amp |