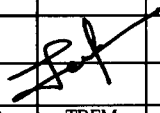




# BHARAT HEAVY ELECTRICALS LIMITED

## TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

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|                                                    |                                                         |          |    |       |                                                                                     |         |                                                                                     |
|----------------------------------------------------|---------------------------------------------------------|----------|----|-------|-------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------|
| DOCUMENT No.                                       | TB-399-316-133                                          | Rev. No. | 00 |       | Prepared                                                                            | Checked | Approved                                                                            |
| TYPE OF DOC.                                       | TECHNICAL SPECIFICATION                                 |          |    | NAME  | JK                                                                                  | SKS     | SKS                                                                                 |
| TITLE<br><br>SPECIFICATION FOR TESTING INSTRUMENTS |                                                         |          |    | SIGN  |  |         |  |
|                                                    |                                                         |          |    | DATE  |                                                                                     |         | 13/05                                                                               |
|                                                    |                                                         |          |    | GROUP |                                                                                     | TBEM    | W.O. No                                                                             |
| CUSTOMER                                           | Tamilnadu Transmission Corporation Limited (TANTRANSCO) |          |    |       |                                                                                     |         |                                                                                     |
| PROJECTS                                           | 400/230-110 KV SS VELLALAVIDUTHI                        |          |    |       |                                                                                     |         |                                                                                     |

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## SECTION - I

### Scope, Quantities and Specific Technical Requirements

#### 1 SCOPE:

This specification is intended to specify the requirements for Supply of operation & maintenance test Instruments & tools required at the sites as mentioned in subsequent clause. The scope of work shall encompass at least the following:

Inspection and testing before supply

- i) Packing, Loading & Transportation to site
- ii) Providing engineering data, drawings, Brochures and O & M manuals for BHEL/TANTRANSCO review, approval and records.
- iii) Demonstration and training at site.

The specification comprises of following sections:

Section-1: Scope, specific technical requirement and bill of quantity

Section-2: General Technical Specification

Section-3: Project Details & General Technical Requirements

Section-4: Enclosures to technical specification

In case of any conflict between various sections, order of precedence shall be in the Section1, Section2, Section3.

The instruments are required for the following Projects:

Customer : Tamilnadu Transmission Corporation Limited (TANTRANSCO)

Project : 400/230-110KV SS AT VELLALAVIDUTHI

## 2 BILL OF QUANTITIES: Refer ***Annexure\_BOQ***

Note:

- a. Techno-commercial evaluation (Supply + Services of respective equipment) shall be done individual item wise. Such as BOQ Sl. No. (A1 & B1), (A2.1, A2.2 & B2), (A3.1, A3.2 & B3), (A4.1, A4.2 & B4), (A5 & B5), A6, A7, A8, A9 A10 & A11 shall be done individual item wise.
- b. The offer without demonstration and training at site (as applicable) shall not be acceptable.
- c. The training at site shall cover operation, evaluation/ analysis of test results and general trouble shooting about the test equipment.
- d. All the above listed testing Instruments shall be supplied with accessories as per section -2 of technical specification. Any other item or accessories, which are essentially required for satisfactory operation of equipment's & for meeting requirements of this specification shall be deemed to be within scope of the successful bidder irrespective of whether these are specifically indicated here or note.

## 3 SPECIFIC TECHNICAL REQUIREMENTS:

- a. Only testing instruments equipment of reputed make with established mechanism in India for prompt after sales services including calibration capabilities will be acceptable.
- b. The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards.
- c. There shall be no licensing limitation of time for usage of the test kit.
- d. Supplier has to impart training to TANTRANSCO Engineers on proper operation / utilization of kit.
- e. Onsite Service support during project guarantee period should be

guaranteed.

- f. Inland service support by the manufacturer should be available in Tamilnadu for all the instruments and testing equipments.
- g. Calibration certificate for all the instruments and testing equipments not older than 2months from the date of supply should be furnished traceable to from NABL / Internationally recognized laboratory.
- h. All equipments should be type tested as per IS/ IEC/Equivalent standards from NABL /Internationally recognized laboratory that should include but not limited to the following:
  - i. EMC & EMI
  - ii. Safety
  - iii. Environmental: Operating & Storage temperature, Operating humidity, Vibration, Shock.  
Operating Temperature for the application requires in the range of 0 to +50°C, Relative Humidity Max. 95% non-condensing
  - iv. Degree of protection as per IEC 60529 /IS /Equivalent standard with suitable IP code.
  - v. Any other type tests required for the application.
- i. Operation manual should be provided.
- j. Onsite demonstration cum training on the testing equipments should be provided if applicable.
- k. The complete equipment should be designed /Engineered by the original equipment manufacturer.
- l. **Test Leads and accessories:** One complete set of cables of sufficient length with suitable clamps & connectors, compatible with the instruments should be provided for successfully carrying out the test in 400kV substation. Additionally, all the required accessories should be provided for the smooth functioning of kit. Minimum testing lead (cable) length shall be 15 meter **or** as specified in section-2 of technical specification whichever is higher.
- m. Hard carrying case (which should be robust / rugged enough) for ensuring proper safety of the kit & test leads during transportation

shall have to be provided.

- n. Trolley suitable for carrying the kit with large wheels and distribution board is to be provided with testing instrument as applicable.
- o. All the testing instrument is to be provided with PC interface cables and software as applicable.
- p. Laptops for testing instruments are to be quoted separately, the same are covered in separate line items in the Bill of Quantity / Price schedule.
- q. **Minimum Configuration for Laptop PC** – It shall be of reputed make (Dell/Lenovo/HP) and latest specifications with minimum **i5 processor, 6GB RAM, 500GB HDD, 15" TFT Screen** or advance technology, Combo 24Xcd R/W DRIVE, complete with required cables and connectors with preloaded Operating system "Windows 7 professional" or advanced, Reputed Antivirus with two-year license and Manufacturer warranty.

#### 4 OTHER TECHNICAL REQUIREMENT

- a. Bidder should be OEM or it's authorized representative / authorized distributor for offered equipments.
- b. **OEM / Manufacturer warranty** is to be submitted during contract stage. Supplier is also required to give an undertaking "to address issue of warranty/after sales services from the respective manufacturer of the equipment".
- c. Supplier shall provide valid calibration certificate, test certificate and warranty certificate for the quoted test equipment as applicable, in the event of order
- d. The Test Equipment shall be delivered to the Employer in new/fresh condition.
- e. The instrument is intended for use in Extra High Voltage and Industrial Environment. The testing equipment are generally meant for carrying out testing at site and movement from one place to another is

unavoidable. Therefore, equipment shall be robust in design so that it gives desired performance even in adverse site conditions. Necessary transport packing arrangement shall be provided along with the equipment.

- f. All accessories that are essentially required for the satisfactory operation of the equipment and for meeting the requirements of this specification shall be deemed to be within the scope of the bidder irrespective of whether these are specified specifically here or not.
- g. The equipment shall be of reputed make and its make will be subject to the approval of TANTRANSCO/BHEL.
- h. Make/Model offered is subject to BHEL/TANTRANSCO approval. BHEL/TANTRANSCO approval shall be considered as final.
- i. Bidder to submit all supporting documents in English. If document submitted by bidder is other than English language, self-attested English translated document should also be submitted.

## 5 INSPECTION & TESTING:

All the testing equipment's shall be inspected prior to dispatch in line with relevant IS/IEC, approved GTP, drawing, Catalogue and technical specification, BHEL/ TANTRANSCO approved QAP.

## 6 BIDDER SHALL SUBMIT THE FOLLOWING DOCUMENTS ALONG WITH OFFER

Following documents should be submitted along with the offer:

- i. Catalogue and Data sheet of offered instrument.
- ii. List of accessories (review & comment of accessories will be done on contract stage)
- iii. List of Past supplies of offered equipment in India & abroad.
- iv. Test Certificates/ reports
- v. Check list as per section -4 of technical specification to be filled for

- each individual testing equipment's as quoted.
- vi. Deviations if any in Technical Deviation schedule.

## 7 CERTIFICATES/ REPORTS

Bidder shall submit valid test reports/ certificates as per relevant standard for review and approval by TANTRANSCO / BHEL.

## 8 GENERAL POINTS (NOTES)

- i. Consideration of offer shall be subject to customer approval of bidders, as applicable.
- ii. Bidder to submit all supporting documents in English. If document submitted by bidder is other than English language, self-attested English translated document should also be submitted.
- iii. Notwithstanding anything stated above, BHEL reserves the right to access the capabilities and capacity of the bidder to perform the contract, should the circumstance warrant such assessment in the overall interest of BHEL.
- iv. After satisfactory fulfilment of all the above criteria / requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.

ANNEXURE\_BOQ

| Sl. No. | Description                                                                                                                       | Unit of Qty. | Total Qty. | Remark                        |
|---------|-----------------------------------------------------------------------------------------------------------------------------------|--------------|------------|-------------------------------|
| 1       | A1: Supply of Transformer Winding Resistance Test Kit 25 amps                                                                     | <b>Nos</b>   | <b>1</b>   | Ref. Clause 15 /Section-2     |
| 2       | A2.1: Supply of CT / PT Analyser Kit (latest)                                                                                     | <b>Nos</b>   | <b>1</b>   | Ref. Clause 5 /Section-2      |
| 3       | A2.2: Supply of Laptop PC suitable for CT / PT Analyser Kit                                                                       | <b>Nos</b>   | <b>1</b>   |                               |
| 4       | A3.1: Supply of Circuit Breaker Analysing Kit ( Multi break)                                                                      | <b>Set</b>   | <b>1</b>   | Ref. Clause 8 /Section-2      |
| 5       | A3.2: Supply of Laptop PC suitable for Circuit Breaker Analysing Kit (Multi break)                                                | <b>Set</b>   | <b>1</b>   |                               |
| 6       | A4.1: Supply of Circuit Breaker Analyzer Kit with DCRM for 400kV CB                                                               | <b>Set</b>   | <b>1</b>   | Ref. Clause 12 /Section-2     |
| 7       | A4.2: Supply of Laptop PC suitable for Circuit Breaker Analyzer Kit with DCRM for 400kV CB                                        | <b>Set</b>   | <b>1</b>   |                               |
| 8       | A5: Supply of Primary Injection Kit 2000 A                                                                                        | <b>Set</b>   | <b>1</b>   | Ref. Clause 7 /Section-2      |
| 9       | A6: Supply of 10KV Digital insulation tester                                                                                      | <b>Nos</b>   | <b>1</b>   | Ref. Clause 17 /Section-2     |
| 10      | A7: Supply of 1000V hand held Digital insulation tester                                                                           | <b>Nos</b>   | <b>1</b>   | Ref. Clause 2 /Section-2      |
| 11      | A8: Supply of Digital clamp on meter (true rms, AC/DC currents up to 2000A)                                                       | <b>Nos</b>   | <b>1</b>   | Ref. Clause 3 & 4A /Section-2 |
| 12      | A9: Supply of Hand held digital AC Current Leakage Clamp Meter 20mA-2A-200A, AC                                                   | <b>Nos</b>   | <b>2</b>   |                               |
| 13      | A10: Supply of Digital Multimeter 4 1/2digits to measure AC/DC Volt, Current, Capacitance, frequency                              | <b>Nos</b>   | <b>2</b>   | Ref. Clause 9 /Section-2      |
| 14      | A11: Supply of Discharge Rod made of PVC with Copper flats & minimum 6 sq.mm cable suitable to earth 400kV Bus at Height 8 meter. | <b>Set</b>   | <b>2</b>   |                               |

| ANNEXURE_BOQ |                                                                                                         |              |            |        |
|--------------|---------------------------------------------------------------------------------------------------------|--------------|------------|--------|
| Sl. No.      | Description                                                                                             | Unit of Qty. | Total Qty. | Remark |
| 15           | B1: Services - Training & Demonstration at site for Transformer Winding Resistance Test Kit 25 amps     | Set          | 1          |        |
| 16           | B2: Services - Training & Demonstration at site for CT / PT Analyser Kit (latest)                       | Set          | 1          |        |
| 17           | B3: Services - Training & Demonstration at site for Circuit Breaker Analysing Kit ( Multi break)        | Set          | 1          |        |
| 18           | B4: Services - Training & Demonstration at site for Circuit Breaker Analyzer Kit with DCRM for 400kV CB | Set          | 1          |        |
| 19           | B5: Services - Training & Demonstration at site for Primary Injection Kit 2000 A                        | Set          | 1          |        |

Service charges for Training & Demonstration at site on certification by BHEL site incharge. Price shall be inclusive of charges for lodging, boarding, medical, insurances etc but excluding the followings (1) To & Fro travel charges shall be reimbursed as actual limited to 2nd AC charges for all visits as per site requirement. (2.) local transportation between Hotel and site shall be arranged by BHEL.

## Technical specification of scientific instruments and Test Equipment& communication equipments

General for all testing instruments:

1. After Sales & Service

Only testing instruments equipment of reputed make with established mechanism in India for prompt after sales services including calibration capabilities will be acceptable.

2. The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards.

3. There shall be no licensing limitation of time for usage of the test kit.

Supplier has to impart training to TANTRANSCO Engineers on proper operation / utilization of kit.

7.General for instruments and testing equipments:

1. Onsite Service support during project guarantee period should be guaranteed.

2. Inland service support by the manufacturer should be available in Tamilnadu for all the instruments and testing equipments.

3. Calibration certificate for all the instruments and testing equipments not older than 2months from the date of supply should be furnished traceable to from NABL / Internationally recognized laboratory.

4. All equipments should be type tested as per IS/ IEC/Equivalent standards from NABL /Internationally recognized laboratory that should include but not limited to the following:

i. EMC & EMI

ii. Safety

iii. Environmental : Operating & Storage temperature, Operating humidity, Vibration,Shock.

Operating Temperature for the application requires in the range of should be 0 to +50°C,Relative Humidity Max. 95% non-condensing

iv. Degree of protection as per IEC 60529 /IS /Equivalent standard with suitable IPcode.

v. Any other type tests required for the application.

5. Operation manual should be provided.

6. Onsite demonstration cum training on the testing equipments should be provided.

7. The complete equipment should be designed /Engineered by the original equipment manufacturer.

### 1) High accuracy Digital multi meter

Industrial grade, Rugged case construction, over load /fuse protection, Auto and manual ranging,True rms , DC Accuracy +/-0.5% Backlit display

Type tests :

Safety as per IS/ IEC/ Equivalent standards.

Degree of protection : IP54

Transient protection : 8KV

- Accessories should include carrying case, Set of necessary test LEADS, HV Probe, Operation manual, Battery.

Calibration certificate should be furnished with the supply of material.

## 2)Digital Insulation Tester 10 KV battery operated

Contractor to provide make, model ,Technical data sheet/ catalog, type test reports with compliance to the following requirements.

- Test and display of insulation resistance,Polarization index, Dielectric absorbtion ratio, Dielectric discharge, Step voltage test, Break down voltage test.
- Microprocessor based, portable, Rugged case construction.
- Auto ranging with programmable test voltage in steps of preferably 50V with accuracy of +/-5% and programmable timers, Auto discharge facility at the end of the test with audible alarm during discharge to alert the operator. Accuracy of IR value shall be preferably +/-5% upto 999 Giga ohm. Range upto 10Tera ohm.
- Operable with rechargeable type battery as well as 230V AC mains.
- Self calibration check at the start up to ensure reliable reading and repeatability of the measurement.
- Builtin AC/DC voltmeter
- Anti glare backlit display with indication of HV presence.

Type tests :

IS 11994, 9223 (latest revision) , Degree of Protection : IP54or better.

Safety of accessories: IEC 61010-31/ Equivalent.

-Safety in accordance with EN 61326-1/ Equivalent.

-EMC in accordance with EN 61010-1/ Equivalent.

- Necessary protection features to protect the equipment against voOverload protection.

- Accessories should include calibration certificate, carrying case, Set of necessary test leads and one set of test leads for 15meter, Operation manual, Battery.

Calibration certificate should be furnished with the supply of material.

| IV.Digital Insulation Tester |                 |                                       |
|------------------------------|-----------------|---------------------------------------|
| Sl.No.                       | Description     | Specifications                        |
| 1                            | Type            | 10 kV Digital Insulation Tester       |
| 2                            | Input Voltage   | 230 V · 10% AC, 50 Hz · 5%            |
| 3                            | Test Voltage    | 250V, 500V, 1kV, 2.5kV, 5kV,7.5kV, DC |
| 4                            | Measuring Range | 10 Tera ohm                           |
| 5                            | Accuracy        | · 5% of reading                       |
| 6                            | Display         | LCD screen with digital display       |

|    |                       |                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7  | Capability            | The 10 kV Digital Insulation tester should be capable of operating both in chargeable Battery supply or with 230V AC 50 Hz supply indicating IR value for heavy duty works and ideal for IR/PI/DAR/DD/SV/Ramp test/Leakage current/Capacitance/Time constant readings of Auto / Power transformers, UG cables and Electrical equipment of Voltage ratings up to 400 kV sub- station environment. |
| 8  | Output V              | 0-10 kV in steps                                                                                                                                                                                                                                                                                                                                                                                 |
| 9  | Operating Temperature | -10°C to +50°C                                                                                                                                                                                                                                                                                                                                                                                   |
| 10 | Relative humidity     | <95%RH, non-condensing                                                                                                                                                                                                                                                                                                                                                                           |
| 11 | Ingress protection    | IP65                                                                                                                                                                                                                                                                                                                                                                                             |
| 12 | Short circuit current | 5 mA                                                                                                                                                                                                                                                                                                                                                                                             |
| 13 | PC compatibility      | USB port with suitable software to support Windows Vista, XP & 2000                                                                                                                                                                                                                                                                                                                              |
| 14 | Type Test             | Type tested as per IS 11994 or IEC 61326, 9223 (latest revision)                                                                                                                                                                                                                                                                                                                                 |
| 15 | Safety                | Confirm to safety standard IEC61010-1.                                                                                                                                                                                                                                                                                                                                                           |

## Standard Accessories:

| Sl.No. | Description                                                             | Quantity |
|--------|-------------------------------------------------------------------------|----------|
| 1      | Test cables minimum 15 Mtr. long Screened cable of 10 kV Voltage rating | 1 Set    |
| 2      | AC power chord                                                          | 1 No.    |
| 3      | Spare fuses                                                             | 1 Set    |
| 4      | Transport case                                                          | 1 No.    |
| 5      | Operating manual                                                        | 1 No.    |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | The test results should have repeatability, consistency & immunity to interference in live switchyard upto 400 kV levels with Noise rejection >3mA.                                                                                                                                                                                                                                                                            |
| 2 | Protection/Control Against short circuit, over load, induction, transient surges etc. Also the instrument should have facility of discharging the specimen when test is completed or when current cable is accidentally disconnected or when instrument power supply is lost. The kit should have built in rapid discharge circuit for automatically discharging the stored energy in the transformer at the end of each test. |
| 3 | . It should be easily portable                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4 | Non-volatile memory to store the measurements..                                                                                                                                                                                                                                                                                                                                                                                |
| 5 | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IEC.                                                                                                                                                                                                                                                                                                                                        |

## GUARANTEED TECHNICAL PARTICULARS :

| Sl.No | Description | Guaranteed |
|-------|-------------|------------|
|-------|-------------|------------|

|    |                       | Specification |
|----|-----------------------|---------------|
| 1  | Type                  |               |
| 2  | Input Voltage         |               |
| 3  | Test Voltage          |               |
| 4  | Measuring Range       |               |
| 5  | Accuracy              |               |
| 6  | Display               |               |
| 7  | Capability            |               |
| 8  | Output V              |               |
| 9  | Operating Temperature |               |
| 10 | Relative humidity     |               |
| 11 | Ingress protection    |               |
| 12 | Short circuit current |               |
| 13 | PC compatibility      |               |
| 14 | Type Test             |               |
| 15 | Safety                |               |

### 3) High accuracy AC/DC Digital Clamp Meter

i) Jaw size: 60mm

ii) Measurement :

True rms for ACV and ACA, Auto and manual ranging.

DC Voltage: 400 mV to 1000V (Accuracy : +/-1% +/-2 digits)

DC Current: 400A to 2000A (Accuracy : +/-1.2% +/-5 digits )

AC Voltage : 4V to 1000V (Accuracy : +/-1.2% +/-5 digits )

AC Current (Using clamp): 400A to 2000A (Accuracy : +/-1.2% +/-5 digits )

DC/AC Current (Using test leads): 40microA to 400mA (Accuracy : )

Resistance: 400ohm to 40Mohm(Accuracy : +/-1% +/-5 digits)

Capacitance: 500 nf to 50micro farad(Accuracy : +/-1% +/-2 digits)

Frequency measurement: 50HZ to 100KHZ(Accuracy : +/-3% +/-5 digits )

Frequency response: 45HZ to 1KHZ

Duty cycle measurement: 1% to 99%(Accuracy : +/-1.2% +/-5 digits )

Test for Continuity check, Diode test, : Yes

Case : Hand held type Rugged case

iii) Power supply : Battery operated with auto power off.

iv) Features:

Low battery indication, Data hold facility, Relative offset. Display :4 &1/2 digits

v) Safety : Overload protection at all ranges, With stand voltage: Upto 8 KV.

vi) Accessories: One set of test leads, Carry case, Manual, Batteries.

### 4A) Handheld Digital clamp meter (True rms AC/DC currents upto 2000 A) TONG Tester Tech specification(digital clamp tester)

| Description  | Specification                                                                                                    |
|--------------|------------------------------------------------------------------------------------------------------------------|
| Construction | Digital ,Hand held industrial grade rugged case construction. Jaw size: 60mm                                     |
| Measurement  | True rms for ACV and ACA, Auto and manual ranging.<br>DC Voltage: 400 mV to 1000V (Accuracy : +/-1% +/-2 digits) |

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | DC Current: 400A to 2000A (Accuracy : +/-1.2% +/-5 digits )<br>AC Voltage : 4V to 1000V (Accuracy : +/-1.2% +/-5 digits )<br>AC Current (Using clamp): 400A to 2000A (Accuracy : +/-1.2% +/-5 digits )<br>DC/AC Current (Using test leads): 40microA to 400mA (Accuracy : +/-1.2% +/-5 digits )<br>Resistance: 400ohm to 40Mohm(Accuracy : +/-1% +/-5 digits)<br>Capacitance: 500 nf to 50micro farad(Accuracy : +/-1% +/-2 digits)<br>Frequency measurement: 50HZ to 100KHZ(Accuracy : +/-3% +/-5 digits )<br>Frequency response: 45HZ to 1KHZ<br>Duty cycle measurement: 1% to 99%(Accuracy : +/-1.2% +/-5 digits )<br>Test for Continuity check, Diode test, : Yes |
| Display/Control            | Low battery indication, Data hold facility, Relative offset. Display :4&1/2 digits backlit antiglare display. Keypad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Test Leads and accessories | One set of test leads, Carry case, Manual, Batteries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Protection                 | Overload protection at all ranges, With stand voltage: Upto 8 KV.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Power supply               | Battery operated with auto power off.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Type tests :               | Degree of protection : IP54<br>EMC, Safety, Environmental tests as per IEC/ Equivalent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| General                    | Refer general specification for test equipments given in this document.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## 5. Computerised CT/PT Analyser testing kit latest with laptop computer

| Sl. No. | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.      | Functional Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| I.      | The instrument shall be able to measure the following parameters on CT automatically.<br>CT-ratio check upto 10000:1<br>CT winding resistance<br>Knee point voltage check upto 30kV<br>Burden impedance<br>Polarity<br>f .Ratio error and phase displacement<br>Automatic demagnetization of the CT after the test                                                                                                                                                       |
| II      | The kit shall be able to plot the excitation curve and locate the Knee point Voltage and Current in real time. Automated comparison of test results with the defined values according to the selected IEEE or IEC standard i.e IEC 60044-1/6, or ANSI/IEEE C57.13. It should offer repeatability of test results in charged switchyard. All relevant parameters should be measured in one test cycle without the need for rewiring. The kit shall confirm the name plate |

|     |                                                                                                                                                                                                                                                                                                |                                                         |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|     | details .It shall also help in analyzing the CT behaviour in case of change of primary or secondary currents when the revised data is entered in to test data.                                                                                                                                 |                                                         |
| III | It should be capable of field testing of protection class CT, Metering CT, GIS CT Transformer bushing CT and all other type of CTs up to 765 KV voltage level.                                                                                                                                 |                                                         |
| IV  | The instrument shall be able to measure the following parameters on PT<br>Polarity<br>Ratio<br>VT burden, Excitation                                                                                                                                                                           |                                                         |
| 2.  | Input Power                                                                                                                                                                                                                                                                                    |                                                         |
|     | 230V $\pm$ 10% at 50 HZ                                                                                                                                                                                                                                                                        |                                                         |
| 3.  | Accuracy                                                                                                                                                                                                                                                                                       |                                                         |
|     | Ratio Measurement                                                                                                                                                                                                                                                                              | 10000:1 with accuracy of 0.05% Typ. Or 0.1% Guaranteed. |
|     | Phase Measurement                                                                                                                                                                                                                                                                              | 1 min Typ. 3min Guaranteed.                             |
| 4.  | Test Leads & Accessories                                                                                                                                                                                                                                                                       |                                                         |
|     | All testing/measurement cables 20 meter long. PC interface cables, Power supply cables, Operating manual, Original CD and software, Application CD etc. Hard carrying case etc to be supplied along with the instrument.                                                                       |                                                         |
| 5.  | Protection                                                                                                                                                                                                                                                                                     |                                                         |
|     | Fuse/MOV/MCB with Over Voltage and Over current, Thermal overload etc., protections should be provided. Zero start and end interlocks shall also be provided.                                                                                                                                  |                                                         |
| 6.  | Software                                                                                                                                                                                                                                                                                       |                                                         |
|     | The kit should be provided with windows based Application Software for analyzing and reporting. The test record shall be able to be downloaded via USB port to a PC in windows Excel/equivalent format.                                                                                        |                                                         |
| 7.  | Display / Keypad Control / Memory / Printer / PC Communication Port                                                                                                                                                                                                                            |                                                         |
|     | It should have a backlit LCD/LED digital display for viewing the Excitation curve and other measurements. The display should be visible in bright sunlight / low light. It should have alpha-numeric keypad for menu navigation and for entering Name plate details to store the test results. |                                                         |
|     | It should store/record minimum 1000 test records in kit and transfer facility to laptop. Each test record must contain up-to 10 saturation curves, turns ratio reading, polarity and DC resistance reading etc.                                                                                |                                                         |
|     | The kit should have USB port for required PC interface.                                                                                                                                                                                                                                        |                                                         |
| 8.  | Operating Temperature                                                                                                                                                                                                                                                                          |                                                         |
|     | 0 to +50°C,                                                                                                                                                                                                                                                                                    |                                                         |
| 9.  | Relative Humidity                                                                                                                                                                                                                                                                              |                                                         |
|     | Max. 95% non-condensing                                                                                                                                                                                                                                                                        |                                                         |
| 10. | Environmental Type Testing                                                                                                                                                                                                                                                                     |                                                         |

|     |                                                                                                                                                                                                |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | The kit shall be compatible for EMI / EMC requirement as per relevant IEC.                                                                                                                     |
| 11. | Testing Safety                                                                                                                                                                                 |
|     | The test set must meet the international safety standard for a CE Mark being IEC 61010-1 safety and IEC 61326-1 for EMC                                                                        |
| 12. | Weight                                                                                                                                                                                         |
|     | It should be highly portable. Instrument weight should be below 20 kg.                                                                                                                         |
| 13. | Warranty                                                                                                                                                                                       |
|     | Minimum 03 years from the date of successful & complete commissioning at sub-station. All the materials including accessories, cables etc. are to be covered under warranty / guaranty period. |
| 14. | Calibration Certificate                                                                                                                                                                        |
|     | Unit shall be duly calibrated before supply and the date of calibration shall not be older than two month from the date of supply of kit.                                                      |
| 15. | Training                                                                                                                                                                                       |
|     | Supplier shall have to ensure that the kit is made user friendly. Supplier has to impart training to TANTRANSCO Engineers on proper operation / utilization of kit.                            |
| 16. | Commissioning, handing over the Instrument                                                                                                                                                     |
|     | Successful bidder will have to commission the instrument.                                                                                                                                      |
| 17. | After Sales & Service                                                                                                                                                                          |
|     | Only equipment of reputed make with established mechanism in India for prompt after sales services including calibration capabilities will be acceptable.                                      |

The kit should be provided with calibration certificate for minimum of 1 year validity. Irrespective of any built in computer facility in the kit, a separate laptop computer with all necessary software should be provided.

## **6. Computerised relay testing kit :**

1. The BOM of the relay test kit under scope of supply is furnished below:

- i. Computerized numerical relay test kit portable type.
- ii. All necessary accessories for test kit
- iii. Dedicated Laptop computer for test kit (Reputed make of latest model; Minimum configuration: 15" TFT screen, 4GB RAM, 320GB HDD or better, COMBO DVD Drive, complete with required cables and connectors with preloaded operating MS Window 7 professional or latest version and all the necessary application software). If application requires better configuration then the better configuration is applicable. Irrespective of any built in computer facility in the kit, a separate laptop computer with all necessary software should be provided.
- iv. All hardwares and softwares for test kit for supporting the following requirements:
  - Digital Trivector meters

- Automated testing of numerical relays including all the relevant protection functions and Power swing simulation.
  - Transducers
  - GPS timing reference unit for end-end testing of line protection schemes
  - IEC 61850 modules (GOOSE Configuration, interpretation, publishing, Edit state sequence for customized testing)
  - Edit and accurate Playback of COMTRADE format file (4V,6I)
  - Heavy burden relays
- v. Relay test templates based on relay model of all the models of all the reputed numerical relay manufacturers.
- vi. Rugged carry case.
- \* The test kit should be suitable for dynamic and transient testing, with facility of transient (IEEE standard COMTRADE format) record playback for both analog and digital channels. Simulate disturbance signal along with DC and high frequency components (with sampling rate of 3kHz or better) as well as Binary signals. The software should be capable of creating customized relay characteristics as well as of importing relay characteristics from IED/Relay
- vii. All manuals in soft copy and hard copy for the complete test kit.
- \* V/I Generators:
- The total current/voltage output channels: 8 nos
- All AC and DC analog channel Outputs should be user interface software controlled/configurable.
- General Protection/ Control features: Against short circuit, over voltage, improper ground connection over load & transient surges, the kit should have alarm/cut-off features settings to protect the instrument. All outputs shall be have short circuit protection and over voltage protection. Specifically current outputs shall be protected against open circuits and prolonged thermal overloads, voltage outputs protected from short circuits.
- The test kit should be operable with power supply of 230VAC +/-10%, 50HZ+/-5%
- Current Outputs:
- 6 phase currents outputs : 0-30A rms with resolution 1mA or finer.
- Output burden : Minimum 150VA per phase.
- Protection : All current outputs shall be protected against open circuits and prolonged thermal overloads
- Voltage Outputs:
- Voltage output:0-300 Volts AC/DC (Ph-N), with resolution 10mV or finer.
- AC output shall be 3-phase voltage output.
- Output Burden: 50VA minimum per phase
- Protection : All current outputs shall be protected against short circuits and prolonged thermal overloads.
- Aux. DC Output:
- DC Output :0-250 V with power rating 50W min. (continuous rating), with continuous / step-less control.
- Protection : All current outputs shall be protected against short circuits and prolonged thermal overloads. Provided with galvanic isolation.
- Accuracy shall be  $\pm 0.2\%$  for voltage and current sources throughout the range.
- The total distortion shall also be less than 0.2%.
- Measuring input:

1. Voltage range -10V to +10 V DC
2. Current range -20mA to +20 mA DC
3. Accuracy -0.02% or better

Test Frequency V/I Generator/Amplifier shall have controlled frequency range from 10Hz to 1 kHz for sine and DC to 3 kHz (minimum) for transients with resolution of 1 mHz or better and accuracy 0.01 % or better

Phase angles:

0 to 359.9° lag/lead with resolution of 0.1 degree or better, with accuracy of 0.5 deg. (min.)

Binary I/O configuration

Minimum four binary outputs and eight inputs with galvanic isolation.

Software controlled input should be capable of sensing potential free relay contacts (NO/NC) as well as potential of 0 to 250V AC/DC.

Associated timers should have time resolution of 100µs or better. The

software controlled outputs should have potential free contacts (NO/NC) with breaking capacity of 8 Amp 250V AC/DC.

Timer:

The Timer will be used to measure high-speed operation of electro mechanical, solid-state and microprocessor-based protection relays. It should incorporate ten (10) sets of banana plug receptacles, which can be programmed to be; Start, Stop Gates and Monitor, or all Stop Gates, or all Contact Continuity Monitors.

Start/Stop Gate De-Bounce facility to eliminate false triggering and contact bounce errors should be featured in the test kit.

Display:

A anti glare, backlit digital display will be provided, which will show the measured output for each current channel, phase angle, frequency, and output status (on or off) for both manual operation and when under computer control.

Standards for compliance:

IEC /Equivalent standard for EMC (Emission)

IEC /Equivalent standard for EMC (Immunity)

IEC /Equivalent for Safety

IEC /Equivalent for Shock, vibration, transit drop

Operating temperature : 0°C to 50°C

Relative humidity: Max 90% Non-condensing

\* Only test equipment of reputed make with established service support in India for prompt after sales services and guarantee support including calibration capabilities will be acceptable. Acceptable make, model are OMICRON CMC356 /MEGGAR SMRT36 with associated hardware and software to meet the specification for the test kit.

\* The kit should be provided with calibration certificate for minimum of 1 year validity and calibrated not older than 2 months from actual date of supply.

Calibration certificate shall be from a NABL recognized laboratory.

\* All firmware and software upgrades relevant to the complete test kit should be provided and installed in the kit at site free of cost for the entire contract guarantee period.

Training:

~~A demonstration cum training to TANTRANSCO engineers on the complete test kit shall be provided that should enable to operate the test kit in all aspects for all the testing of the devices stipulated in this specification.~~

## 7. Primary injection kit (2000A)

|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| Supply Voltage  | 230V AC, 50 Hz                                                    |
| Output Voltage  | 6V at 1000A, Continuous 6V at 2000A, for 3 min 6V at 7000A 1 sec. |
| Output current  | 1000A, 2000A, 7000A                                               |
| Type of cooling | Natural air cooled                                                |
| Duty cycle      | Continuous                                                        |

Standard Accessories:

| Sl.No. | Description                      | Qty.   |
|--------|----------------------------------|--------|
| 1      | Test cables minimum 20 Mtr. long | 1 Set. |
| 2      | AC power chord                   | 1 Set. |
| 3      | Spare fuses                      | 1 Set. |
| 4      | Transport case                   | 1 No.  |
| 5      | Operating manual                 | 1 No.  |

1.The kit should be suitable for checking the current transformer ratio as well as for conducting primary injection tests and bus-bar stability test in sub-station upto 756kV.

2.Necessary in built cooling, if required, arrangement should be provided to dissipate the heat generated during use. No external coolant/ accessory shall have to be required.

3.It should be easily portable.

5. Only equipment of reputed make with established mechanism in India for prompt after sales services including calibration capabilities will be acceptable.

## 8.Circuit breaker Analysing kit (Multi break)

| Description            | Specification                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Functional Requirement | <p>1. The instrument should be suitable for measuring the operation timing of main, PIR and auxiliary contacts (wet &amp; dry) as well as coil currents.</p> <p>2. It should measure the Dynamic Contact Resistance of main &amp; arcing contacts as well as travel measurement (with external travel transducer) of operating mechanism.</p> <p>3. The instrument should be suitable for testing the CBs upto 400 kV as</p> |

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | per applicable standards and testing procedure of TANTRANSCO.<br>4. The test results should have repeatability, consistency & immunity to electromagnetic interference in live switchyard upto 400 kV levels.                                                                                                                                                                                                                                                                 |
| No. of Channels            | 1. Main Contact Channels: 24 (4 Main + 4 PIR per pole on 3 pole simultaneously)<br>2. Aux. Contact Channel: 06 wet & 06 Dry<br>3. DCRM/Test Current Channels:12 set (6 Channel for resistance + 6 channel for current)<br>4. Travel Channel:06<br>5. Coil Current Channel:06                                                                                                                                                                                                  |
| Sampling Speed             | Upto 20 kC                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Accuracy                   | 1. Timing : $\pm 1$ % of reading<br>2. Coil Current: $\pm 1$ % of reading<br>3. R : $\pm 2$ % of reading<br>4. Travel: $\pm 1$ % of reading                                                                                                                                                                                                                                                                                                                                   |
| Measurement Range:         | 1. Timing: 0-4 s<br>2. R : 0-8 mohm<br>3. Coil Current:0-25 A                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Resolution                 | Timing: 0.1 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| DCRM Test Curren           | 100 A.(Minimum)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Test Leads and accessories | One complete set of cables of sufficient length (min 20metre) with suitable clamps & connectors, compatible with the instruments should be provided for successfully carrying out the test in TANTRANSCO substation. Additionally all the required accessories should be provided for the smooth functioning of kit. Further hard carrying case (which should be robust/ rugged enough) for ensuring proper safety of the kit during transportation shall have to be provided |
| Travel Transducers         | One set of travel transducers along with clamp/fixtures to suit 400/230 /110 kV CBs.                                                                                                                                                                                                                                                                                                                                                                                          |
| Design/Engg.               | The complete equipment along with complete accessories must be designed/engineered by Original Equipment Manufacturer.                                                                                                                                                                                                                                                                                                                                                        |
| Power Supply               | It shall work on single phase 230 Volts $\pm 10$ %, 50 Hz $\pm 5$ % supply with standard socket                                                                                                                                                                                                                                                                                                                                                                               |
| Operating Temperature      | 0 to +50 deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Relative humidity          | Max. 90% non-condensing                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                                        |                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protection/<br>Control                 | Against short circuit, over voltage, improper ground connection over load & transient surges, the kit should have alarm/cut-off features to protect the instrument. Also the kit should have facility of stopping automatically on power failure.                                                                                       |
| Cooling<br>Arrangement                 | Necessary in built cooling arrangement should be provided to dissipate the heat generated during testing. No external coolant/ accessory shall have to be required                                                                                                                                                                      |
| Weight                                 | It should be highly portable and trolley mounted for smooth movement in live switchyards.                                                                                                                                                                                                                                               |
| Software                               | The software should be suitable for automatic testing & report generation, signature as well as trend analysis. The kit should have facility to store and communicate with windows based computer for exporting the test data.                                                                                                          |
| PC Interface                           | It shall include supply of one laptop PC of reputed make and latest specifications with minimum 4GB RAM, 320GB or better HDD, 15" TFT Screen, Combo 24Xcd R/W DRIVE, facility complete with required cables and connectors with preloaded Operating system and application software require for storage analysis and record management. |
| Environment                            | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IEC/ Equivalent standards.                                                                                                                                                                                                                           |
| Calibration<br>Certificate             | The kit should be provided with calibration certificate for minimum of 1 year validity. Irrespective of any built in computer facility in the kit, a separate laptop computer with all necessary software should be provided.                                                                                                           |
| Training                               | Supplier shall have to ensure that the kit is made user friendly. A detailed demonstration cum training at site for TANTRANSCO engineers.                                                                                                                                                                                               |
| Manufacturer<br>and Service<br>support | Only equipment of reputed make with established service support for attending guarantee of the equipment, provide spares support and calibration capabilities will be acceptable.                                                                                                                                                       |

### 9.DIGITAL MULTIMETER:

Supply of Digital Multimeter, Which shall capable of measuring voltage, current, Resistance, capacitance and frequency measurement in electrical circuits at indoor and outdoor. The multimeter shall be handy, easy to use and should have impact and shock proof protection holster.

Shall have automatic and manual measurement range selection.

Shall have integrated data hold, low battery indication and auto power off feature.

Shall have Diode , acoustic continuity test facility and acoustic warning signal for incorrect use and fuse protection for all modes.

Technical parameters:

- Power : 9V.
- Display : LCD 3 ¾ Digit, 6000Counts, Digital keypad
- Measurement range : True RMS
- Voltage : 0.1mV- 1000V AC/DC
- Current : 0.1 mA- 10A AC/DC
- Accuracy : ±1.4% reading +5D
- Resistance : 0.1Ω - 60MΩ
- Accuracy : ±1% reading till 600kΩ , ±5% higher range
- Capacitance : .01Nf - 60nF , ±(5.0%rdg+ 6D)
- 8. Frequency : 10 HZ to 600HZ (±0.5% +3D)
- 9. Degree of protection : IP54
- 10. Confirms to IS and IEC norms. IEC/EN 61326-1/ Equivalent.  
- IEC/EN 61010-1/ Equivalent

#### **10) Metering PC**

|                 |                                                                                                                                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type            | Industrial grade substation-hardened computer hardware equipment suitable for desk mount/Rack mount.                                                                                                                          |
|                 | Includes all necessary software and hardware for the application. Keyboard ,Mouse ,Monitor. CD-ROM / DVD-ROM with read write facility.                                                                                        |
| HDD             | 2 x 250GB SATA/SCSCI HDD (In case 250GB is not sufficient for application including data then higher capacity shall be provided for each HDD)                                                                                 |
| RAM             | Expandable RAM equipped for 2GB or 200% application requirement whichever is higher.                                                                                                                                          |
| DISPLAY MONITOR | 27" LED monitor Flicker free, high resolution of reputed make. Flicker free, Anti glare, IPS Panel, Full HD Resolution (1920x1080) with HDMI port and conventional port interface for computer interface. Min height : 15.5". |

All relevant original software and tools for viewing in real time and generating reports relevant to metering data. The metering data from the meters shall be integrated in to the station HMI servers in real time through the SAS LAN and the same shall be available from the HMI server to the metering PC as a client. All HMI servers shall be provided with comprehensive anti-virus protection and cyber protection as appropriate

## DIGITAL MULTIMETER:

### Guaranteed Technical parameters:

1. Power :
2. Display :
3. Measurement range :
4. Voltage :
5. Current :
6. Resistance :
7. Capacitance :
8. Frequency :
9. Degree of protection :
10. IEC/EN/ IS/Safety :

Standards.

### **11.CIRCUIT BREAKER ANALYZER KIT : ACCESSORIES:**

Standard accessories for 6channels.

Travel transducers – for EHV Breaker type and model.

DCRM RACK – 6Channels with accessories.

Laptop computer with i5 Processor

Trolley suitable for carrying the kit with large wheels and distribution board.

## 12. Technical Specification of Circuit Breaker Analyzer with DCRM for 400 KV CB

| Item                       | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Functional Requirement     | <p>The instrument should be suitable for measuring the operation timing of main, PIR and auxiliary contacts (wet &amp; dry), travel parameters including contact gap, wipe, total travel, over-travel, rebound, velocity as well as coil currents.</p> <p>It should measure the Dynamic Contact Resistance of main &amp; arcing contacts as well as travel measurement (with external travel transducer) of operating mechanism.</p> <p>The instrument should be suitable for testing the CBs upto 400 kV</p> <p>The test results should have repeatability, consistency &amp; immunity to electromagnetic interference in live switchyard upto 400 kV levels.</p> |
| No. of Channels            | <p>Main Contact Channels: 24 (4 Main + 4 PIR per pole on 3 pole simultaneously)</p> <p>Aux. Contact Channel: 04 wet &amp; 04 Dry</p> <p>DCRM/Test Current Channels: 6 sets (6 Channel for resistance + 6 channel for current)</p> <p>Travel Channel: 03</p> <p>Coil Current Channel: 06</p>                                                                                                                                                                                                                                                                                                                                                                        |
| Sampling Speed             | 20 kC, 10 kC, 5kC, 1 kC user selectable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Accuracy                   | <p>Timing : Measured Value <math>\pm 0.05\%</math> <math>\pm</math> Resolution</p> <p>Coil Current: Measured Value <math>\pm 0.5\%</math> <math>\pm</math> Resolution</p> <p>Resistance : Measured Value <math>\pm 2\%</math> <math>\pm</math> Resolution</p> <p>Travel: Measured Value <math>\pm 0.5\%</math> <math>\pm</math> Resolution</p>                                                                                                                                                                                                                                                                                                                     |
| Measurement Range:         | <p>Timing: 0-40 Sec</p> <p>Resistance : 0-8 m <math>\Omega</math>.</p> <p>Coil Current: 0-25 A</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Best Resolution            | <p>Timing: 0.05 mSec,</p> <p>Coil Current : 1mA,</p> <p>Travel: 0.01 mm,</p> <p>Resistance – 0.1% of selected Range.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| DCRM Test Current          | 100 Amp., Sourced from in-built battery. Isolated battery source for each DCRM Channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test Leads and accessories | <p>Timing Cables: 20 meter long (6 nos.).</p> <p>DCRM Cables: 20 meter long ( 6 nos.).</p> <p>Auxiliary Contact Cable (8 nos.),</p> <p>Travel Cable (3 nos),</p> <p>Coil Current Cable (6 nos),</p> <p>breaker control cable ( 1 set) : Each 10 meter long.</p> <p>Other cables: Master Earthing cable, Input Mains power cord, Ethernet cable for communication between laptop and kit.</p>                                                                                                                                                                                                                                                                       |
| Travel Transducers         | One Set each consisting of three nos. of Travel transducers along with mounting fixtures to suit 765kV CBs of make to be provided in the proposed Substation. The make and type shall be intimated along with the order. Separate set of 3 nos. of transducers with fixture to be supplied for each make & type of CB.                                                                                                                                                                                                                                                                                                                                             |
| Design/Engg.               | The complete equipment along with complete accessories must be designed /engineered by Original Equipment Manufacturer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Power Supply               | It shall work on single phase 230 Volts $\pm 10\%$ , 50 Hz $\pm 5\%$ supply with standard socket.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                         |                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature   | 0 to +50 deg C                                                                                                                                                                                                                                                                                                                                   |
| Relative humidity       | Max. 90% non-condensing.                                                                                                                                                                                                                                                                                                                         |
| Weight & Carrying Case  | It should be portable and should be supplied with rugged aluminium carrying cases for instruments & moulded cases for Test Leads                                                                                                                                                                                                                 |
| Trolley                 | Instrument should be trolley mounted for smooth movement in live switchyards. Trolley should have large wheels and will be supplied with kit.                                                                                                                                                                                                    |
| Software                | The software should be suitable for creating test set-up, testing & report generation, multiple signature comparison as well as trend analysis of all important parameters including Timing, Coil Current, Travel. Software shall have facility to export the test results to PDF/WORD/EXCEL. The operation of the kit should be through laptop. |
| PC Interface            | It shall include supply of one laptop PC of Dell/Lenovo/HP make with latest specifications such as Core i3 Intel Processor, 2GB RAM, 320GB or better HDD, 14" TFT screen, Combo CD R/W Drive complete with required cables and connectors with preloaded operating system MS Window 7 professional and anti-virus software.                      |
| Environment             | The test kit shall be compatible for switchyard environment.                                                                                                                                                                                                                                                                                     |
| Type-Testing            | Kit shall be type tested for Environmental Tests including Shock, Vibration, Bump, Dry Heat, Damp Heat, Supply Voltage Variation, Change of Temperature as per IS 9000/IEC 60068; EMI/EMC Tests as per IEC 61326 and Safety Tests as per IEC 61010.                                                                                              |
| Guarantee               | Warranty/Guarantee Period: Min 01 year from the date of commissioning at sub-station.                                                                                                                                                                                                                                                            |
| Calibration Certificate | Unit shall be duly calibrated before supply and the date of calibration shall not be older than two month from the date of supply of Kit.                                                                                                                                                                                                        |
| Training                | Supplier shall have to ensure that the kit is made user friendly. The supplier shall also have to arrange necessary training to engineers, where kit is being supplied.                                                                                                                                                                          |
| After sales service     | Bidder will have to submit the documentary evidence of having established mechanism in India for prompt after sales & calibration services.                                                                                                                                                                                                      |

### **13. TECHNICAL SPECIFICATIONS**

#### **OPTICAL LASER SOURCE METER**

1. wave length(nm) : 1310 & 1550
2. Emitter type : LD
3. Central wave length : 1310±20nm & 1550±20nm
4. spectral width : 5nm
5. output frequency(HZ) : 270,1K,2K
6. Output power : -5dBm
7. Adjustable range : ±3dB, 0.1dB/ step
8. auto power off : yes
9. Back light : yes
10. operating temperature : -10 to 50°C
11. storage temperature : -20 to 70°C
12. power supply : 6v, 2500mAh
13. output stability :  
 short term(15min) < ±0.05Db @ 1310, 1550nm  
 Long term(8hours) < ±0.1dB @ 1310, 1550nm

14. Relevant IEC/EN/VDE standards.

Standard accessories:

FC/PC,ST/PC,SC/PC interchangeable connectors,

Manual,

Carrying bag,

Battery,

Software(CD with USB cable),

AC/DC charger,

Test report.

## 14. OPTICAL POWER METER

### TECHNICAL SPECIFICATIONS:

1. Calibrated wavelength(nm) : 850/1300/1310/1400/1550/1625

2. Detector Type : InGaAs

3. Accuracy :  $\pm 5\% \pm 1\text{Nw}$

4. Resolution : 0.01dB@-60 to +10dBm  
0.1dB@-70 to -60dBm

5. Linearity :  $\pm 5\%$

6. Auto power off : yes

7. Backlight : yes

8. Reference value : yes

9. Measuring range(dBm) : -70 to +26

10. USB interface : yes

11. Data storage : yes

12. Wave length recognize : yes

13. Tone detection(HZ) : 270,1K,2K

14. Operating temperature : -10 to 50°C

15. Storage temperature : -20 to +70°C

16. Power supply : 6VAC/DC 2500Mah

17. Relevant IEC/EN/VDI standards.

## 15. TRANSFORMER WINDING RESISTANCE Kit:

|                          |                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Display                  | 4 ½ digit Backlit LCD for measuring resistance & Test Current, viewable in direct sun light & low light.                                |
| Accuracy                 | $\pm 0.5\% \pm 5$ counts on all ranges.                                                                                                 |
| Power input              | 230V AC $\pm 10\%$ , 50 Hz $\pm 5\%$ .                                                                                                  |
| Test Range               | 20 m Ohms – 20 Ohms ( in 4 or more convenient Selectable range)                                                                         |
| Test Current range       | 25 Amps DC continuous                                                                                                                   |
| No. of measuring channel | 2                                                                                                                                       |
| Open circuit Voltage     | 30V DC (minimum)                                                                                                                        |
| Resolution               | 0.001 m. Ohm upto 20 m. Ohm range<br>0.01 m. Ohm upto 200m. Ohm range.<br>0.1 m. Ohm upto 2 Ohm range.<br>1.0 m. Ohm upto 20 Ohm range. |
| Operating Temperature    | 0 to +50 deg C                                                                                                                          |

|                        |                     |
|------------------------|---------------------|
| Relative humidity Max. | 95% non-condensing. |
|------------------------|---------------------|

Standard Accessories:

| Sl.No. | Description                                                                        | Qty.   |
|--------|------------------------------------------------------------------------------------|--------|
| 1      | Test cables minimum 20 Mtr. long (current and Potential Cables) with clamps/clips. | 1 Set. |
| 2      | Short lead 10 m long, with corocodile clips                                        | 1 Set. |
| 3      | Master earthing cable 5 Mtr. Long                                                  | 1 No.  |
| 4      | Power cord 5 Mtr. Long                                                             | 1 No.  |
| 5      | Spare fuses.                                                                       | 1 Set. |
| 6      | Carrying case/Built incase for inst.                                               | 1 No.  |
| 7      | Instruction manual                                                                 | 1 No.  |

1. The kit shall have the capability to test the 756kV transformer (upto 500 MVA) both in star and Delta configuration as per the applicable standards.
2. To measure transformer winding resistance and proper operation of onload tap changers.
3. Shall be suitable to overcome high inductance of the transformer and quickly allow fast measurement.
4. The test results should have repeatability, consistency & immunity to interference in live switchyard upto 765 kV levels.
5. Protection/Control Against short circuit, over load, induction, transient surges etc. Also the instrument should have facility of discharging the specimen when test is completed or when current cable is accidentally disconnected or when instrument power supply is lost. The kit should have built in rapid discharge circuit for automatically discharging the stored energy in the transformer at the end of each test.
6. Necessary in built cooling, if required, arrangement should be provided to dissipate the heat generated during use. No external coolant/ accessory shall have to be required.
7. It should be easily portable.
8. Non-volatile memory to store the measurements.
9. The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IEC.

#### ~~16. The Static Trivector Meter~~

~~The Static Trivector Meter shall conform to CBIP Specification Technical Report No.88 – July 1996 or to the latest issue with 0.2 accuracy class. The current transformer secondary leads shall be provided with shorting links, test links and isolating facilities.~~

**(17) 1000V Hand Held Digital Insulation Tester****Industrial Insulation Resistance measurement Meter with CAT IV rating**

- ❖ Digital / Analog Insulation Tester with 50V,100V,250V,500V & 1000V
- ❖ Simple to use operation
- ❖ IP 54 protection
- ❖ Should have insulation resistance range of 5 G ohms (@50V) to 200 G ohms (@1000V)
- ❖ Leakage current display, test voltage display should be available
- ❖ Timed Insulation, Polarization Index and DAR tests should be possible
- ❖ Should have continuity measurement with selectable threshold buzzer
- ❖ Safety features like live circuit warning (at 50V), default voltmeter
- ❖ Should be compliant to safety protection IEC 61010-1 to 600V phase to earth, Category IV
- ❖ Should have EMC Compliance tested in accordance to IEC 61326-1
- ❖ TRMS voltage measurement to 600V
- ❖ Frequency range should be from 40 Hz to 400 Hz
- ❖ Backlight, Auto power shut down, Battery condition display, features should be available
- ❖ Full scale accuracy on all ranges: +/- 2% upto 100 M ohms
- ❖ Short circuit current : 2 mA
- ❖ Leakage current range: 10.....2000 uA
- ❖ Should meet international safety requirements of IEC 1010-2 and EN61557
- ❖ Power supply : 5 x 1.5V AA cells (Should accept rechargeable batteries)
- ❖ Battery Life : 5000 consecutive tests
- ❖ Test inhibit feature should be available to prevent testing if voltages more than 50V are detected when using for insulation measurement
- ❖ Test lock should be available to lock insulation test on continuously
- ❖ Live circuit detection and test inhibit should function even if the protection fuse has failed
- ❖ Display should be of analog arc and a dual digital readout. Logarithmic display should be used for better low insulation value measurements
- ❖ One year warranty
- ❖ Weight should not exceed 1 kg

The instrument should be supplied with Test lead set, crocodile clips and remote switch probe with protective rubber boot.

The bidder should give point by point compliance alongwith the quotation. The quotations without compliance sheet will be summarily rejected.

Preferred brand: Fluke/Megger.

## **SECTION – 3**

### **PROEJCT DETAILS & GENERAL TECHNICAL REQUIREMENT**

#### **3.0 FOREWORD**

The provisions under this section are intended to supplement general requirements for the materials, equipment's and services covered under other sections.

#### **3.1 PROJECT INFORMATION AND SYSTEM PARAMETERS**

- a) Customer : M/s Tamil Nadu Transmission Corporation Limited
- b) Project Title : 400/230-110 kV Substation at Vellalaviduthi
- c) Transport facilities : Road/Rail

##### **Physical and other parameters:**

- 3.1.1 Location of the substation : Vellala viduthi, Pudukottai district
- 3.1.2 Nearest Railway station : Pudukottai  
Railway : Southern Railway
- 3.1.3 Meteorological data
- (i) Maximum ambient temperature : 50°C
  - (ii) Minimum ambient temperature : 20°C
  - (iii) Maximum daily average ambient air temperature : 45° C
  - (iv) Maximum yearly average ambient air temperature : 32° C
  - (v) Maximum Humidity (%) : 100%
  - (vi) Average thunder storm days per annum : 50
  - (vii) Average rainy days per annum : 90
  - (viii) Average annual rainfall (mm) : 1000 mm
  - (ix) No. of months during which tropical monsoon condition prevail : 5
  - (x) Maximum wind pressure : 150 Kgf/Sqmm
  - (xi) Altitude above MSL : 1000M

However for design purpose, ambient temperature should be considered as 50° C and relative humidity as 100%.

| <b>MAIN ELECTRICAL PARAMETRS:</b> |                   |                                                                            |
|-----------------------------------|-------------------|----------------------------------------------------------------------------|
| a)                                | Fault Levels      | 400kV: 63kA for 1 sec.<br>230kV: 40kA for 3 sec.<br>110kV: 40kA for 3 sec. |
| a)                                | Creepage Distance | 25mm/kV                                                                    |

### 3.1.4 AUXILIARY POWER SUPPLY :

Auxiliary electrical equipment's, maintenance equipment's etc., shall be suitable for operation on the following supply system.

|                   |                                                                                                |
|-------------------|------------------------------------------------------------------------------------------------|
| 3 phase AC Supply | 415V, 3 phase 4 wire, 50 Hz, neutral grounded AC supply<br>-10% to +10%, Frequency +/- 5%      |
| 1 phase AC supply | 240V, single phase, 50 Hz, neutral grounded AC supply<br>-10% to +10%, Frequency +/- 5%,       |
| DC supply         | 220V, 2 wire DC supply + 10% to -15%, Ungrounded<br>48V, 2 wire DC supply , Positively earthed |

## 3.2 GENERAL REQUIREMENT

**3.2.0 ALL THE EQUIPMENTS / MATERIALS TO BE SUPPLIED SHOULD BE IN ACCORDANCE WITH RELEVANT LATEST / AMENDED IS/IEC, WHETHER IT HAS BEEN SPECIFICALLY MENTIONED IN THE SPECIFICATION OR NOT.**

**3.0.1** The bidder shall also furnish drawings for the following:

All EQUIPMENTS and type of clamps, fittings hardware, insulators, bus bar. These designs/ drawing shall be got approved by the purchaser before commencing the manufacture/ construction/ erection and are to be as per latest IS/ IEC.

### 3.2.2 GENERAL:

The bidder shall be fully responsible for providing all equipment, materials system and services specified or otherwise which are required to complete the construction and successful commissioning of the substation in all respects.

Any other items not specifically mentioned in the specification but which are required for erection of materials/equipment under the scope of work, testing and commissioning are deemed to be included in the scope of the specification unless specifically excluded.

All items shall be supplied as per schedule and as specified in the relevant Indian standard of latest revision. The Technical specification of the main materials/equipment is furnished. The Technical specification contained herein for the materials are for the guidance of the tenderer.

The bidders are requested to procure the equipment's/materials/component only from reputed /qualified manufacturer as per Technical requirement stipulated in Section-1 of Technical specifications. Approval of make of item shall be taken up by vendor from TANTRANSCO himself.

## 3.3 SPECIFIC REQUIREMENT

The bidder shall furnish make/manufacturer, catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification and get approval from competent authority before commencement of any work.

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All steel materials, other than materials for earthing should be of galvanized if not specified.

### **3.4 STANDARD:**

The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

The equipment to be furnished under this specification shall conform to latest issue with all amendments (as on the date of bid opening) of standards specified in the specification.

The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

The Bidder shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS/IEC.

When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

### **3.5 TEST CERTIFICATE:**

Copies of all test certificates relating to material to be procured by the contractor for the works shall be forwarded to the OWNER.

### **3.6 TESTS :**

All the tests as per relevant IS/IEC shall be carried out.

### **3.7 MATERIALS AND WORKMANSHIP:**

All the materials shall be of the best class and capable of satisfactory operation in the tropics with humid atmosphere conditions. Unless otherwise specified, they shall conform to the requirements of the appropriate IS/IEC.

The workmanship shall be of the best grade and the entire construction in accordance with the best modern practice.

The equipment shall be designed to facilitate inspection and repairs and to ensure satisfactory operation under atmosphere condition prevailing at site and under such sudden variation of load and voltage as may be met with under working conditions in the system including those due to faulty synchronizing and short circuit within the rating of the apparatus.

The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment.

All the equipments should operate without undue vibration and with the least practicable amount

of noise.

### **3.8 INSPECTION :**

The inspection may be carried out by the TANTRANSCO/BHEL at any stage of manufacture. The supplier shall grant free access to TANTRANSCO's/BHEL representative at a reasonable time when the work is in progress. The TANTRANSCO/BHEL shall have access at all times to the works and all other places of manufacture/fabrication, where the equipments are being manufactured/fabricated and the bidder shall provide TANTRANSCO's/BHEL representative all facilities for unrestricted inspection of the works, raw materials, manufacture of all the accessories and for conducting necessary tests.

Inspection and acceptance of any equipment under this specification by the TANTRANSCO/BHEL shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. The supplier shall keep the TANTRANSCO/BHEL informed in advance, about the manufacturing programme so that arrangement can be made for inspection.

The TANTRANSCO/BHEL , reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested.

The correct grade and quality of steel shall be used by the supplier. To ascertain quality of steel, the TANTRANSCO/BHEL may at his discretion get the material tested at an approved laboratory.

The bidder shall take an account the fabrication wastage while quoting the rates. The Employer will not accept any liability in connection with the wastage of steel during fabrication or otherwise. Steel shall be procured exclusively from the main producers. However, sections not rolled by main produces can be procured from reroller, provided rerolling of structural steel section is done from billets/ingots of tested quality. Rerolled sections are duly tested as per relevant standards. Supplier should obtain approval of list of primary producers of Steel and Zinc before Proto assembly.

The BHEL/TANTRANSCO or his representative shall have the right to inspect and/or test the goods /works to confirm their conformity to the supplier. BHEL/TANTRANSCO shall notify the supplier in writing of the identity of any representatives authorized for these purposes.

The inspections and tests may be conducted on the premises of the supplier or his Sub vendor at the point of delivery and /or at the goods' final destination. Where tests are conducted in the premises of Supplier, all reasonable facility and assistance including access to drawings and production data shall be furnished at no charge to the BHEL.

Should any inspected or tested goods fail to conform to specifications, the BHEL/TANTRANSCO may reject them and the supplier shall either replace the rejected goods or make all alterations necessary to meet specification requirements free of cost to the BHEL/TANTRANSCO within one week of intimation.

The BHEL/TANTRANSCO's right to inspect, test and where necessary reject the goods after the goods; arrival at the site, shall in no way be limited or waived by reason of the goods having been previously inspected. Tested and passed by the BHEL/TANTRANSCO or his representative prior to the goods dispatch.

Not less than 15 (Fifteen) days advance intimation shall be given about the quantity of materials that will be ready for inspection by the officers of TANTRANSCO/ BHEL/Third agency authorized by the Corporation. The materials should not be dispatched without instruction from the Corporation.

### **3.9 GUARANTEE:**

The supplier shall guarantee that the goods under the Contract are new, unused of the most recent or current models and incorporated all recent improvements in design and materials unless provided otherwise in the Contract. The supplier shall further guarantee that the goods supplied under this Contract shall have no defects arising from design, materials or workmanship, installation and erection, if that may develop under normal use of the supplied goods. The supplier shall also guarantee the performance of the works executed by him including the performance of all the materials/goods supplied by him.

BHEL shall promptly notify supplier in writing of any claims arising under guarantee in respect of goods. Upon receipt of such notice, the supplier shall, with all reasonable speed, repair or replace the defective works or parts thereof, free of cost at site. All the expenses towards transportation of defective parts to supplier's works and of repaired/replaced parts to site shall be borne by the Supplier.

If the Supplier, having been notified, fails to remedy the defects within 14 days, the BHEL will proceed to take such remedial action as may be necessary, at the supplier's risk and expenses. All expenses in this regard will be recovered from Supplier.

### **3.10 PRE COMMISSIONING TESTING (if applicable) :**

On completion of erection of equipment's and before charging each item of equipment's shall be thoroughly cleaned and inspected jointly by the TANTRANSCO/ BHEL and the bidder for correctness and completeness of installation and acceptability for charging leading to initial pre commissioning test. The pre commissioning testing to be carried all equipment's in the presence of BHEL/ TANTRANSCO. Necessary tools, testing kits to be arranged by the Supplier.

### **3.11 DOCUMENTATION :**

All drawings shall conform to relevant international standards Organization (ISO) specification. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in S.I. units.

### **3.12 PAINTING, GALVANISING :**

All interiors and exteriors of all metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter and the surfaces treated by phosphating (e.g. seven tank phosphating sequences).

All metal surfaces exposed to atmosphere shall be given, in addition to the treatment, two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limits specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling. All external paintings shall be as per shade **No.697/631 of IS-5**.

Paint inside the metallic housing shall be of anti condensation type and the paint on outside surfaces shall be suitable for outdoor installation.

All components shall be given adequate treatment of climate proofing as per **IS: 3202** so as to withstand corrosive and several service conditions.

All ferrous parts including all sizes of nuts, bolts, support channel structures, etc. as also the mechanism housing shall be hot dip galvanized conforming to latest version of IS : 2629 or epoxy painted. Spring washers shall be electro-galvanised.

All members of the structure members shall be hot dipped galvanised with a zinc coating of **610 gms. per square metre** . Galvanising shall be done after a work is completed, except that the nuts may be tapped or rerun after galvanization. The zinc coating shall be smooth, clean, of uniform thickness and free from defects. The preparation for galvanising itself shall not adversely affect the mechanical properties of the coated materials. The employer shall be at liberty to have the samples of zinc used, test checked in any laboratory at his own cost and reject the particular supply if it is below standard.

All galvanised material shall withstand test as per IS 2633-1972 or any other equivalent standard. The zinc used for galvanising fabricated material shall be of high grade Electrolytic zinc of 99.99% purity.

All nuts and pins shall be adequately locked. Nuts, bolts and pins used inside the transformer and tap-changer compartment where gaskets are not used shall be provided with spring washers or locknuts. Where galvanizing is specified, it shall be applied by the hot dipped process or by electro-galvanizing process and for all parts, other than steel wires, shall consist of a thickness of zinc coating equivalent to not less than 610gm of zinc per square meter of surface. The zinc coating shall be smooth, of uniform thickness and free from defects.

### **3.13 SURFACE FINISH**

All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible, shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a

suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.

### **3.14 PROTECTION**

All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner. Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

### **3.15 FUNGI-STATIC VARNISH**

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on the parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application to the varnish.

### **3.16 DEGREE OF PROTECTION**

The supplier shall propose following Degree of protection for those equipment/Items for which the degree of protection has not been specified in the specification for the approval of BHEL/TANTRANSCO. The decision of BHEL/TANTRANSCO shall be final. The enclosures of the Control Cabinets, Junction boxes and Marshalling boxes, panels etc to be installed shall provide degree of protection as detailed here under:

- a) Installed outdoor: IP-55
- b) Installed indoor in air conditioned area: IP-42
- c ) Installed in covered area IP:52
- d) For LT switchgear (AC & DC distribution Boards): IP-54

The degree of protection shall be in accordance with IS: 13947 (Part-1)/ IEC-60947 (Part-1)/ IS 12063 / IEC-60529. Type test report for degree of protection test on each type of the box shall be submitted for approval.

### **3.17 FIRST FILL OF CONSUMABLES, OIL AND LUBRICANTS**

All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications, into operation, shall be furnished by the Contractor unless specifically excluded under the exclusions in these

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specifications and documents.

### **3.18 RATING PLATES, NAME PLATES AND LABELS :-**

The equipments shall be provided with a rating plate or plates marked with but not limited to following data whatever needs to that particular equipments (as applicable).

- (a) Manufacturer's name or trade mark.
- (b) Serial number and type design making it possible to get all relevant information from the manufacturer.
- (c) Year of manufacture.
- (d) Rated voltage
- (e) Rated insulation level.
- (f) Rated frequency
- (g) Rated Normal current.
- (h) Rated short circuit breaking current
- (i) First pole to clear factor
- (j) Rated duration of short circuit
- (k) Rated auxiliary D.C. supply voltage of closing and opening devices.
- (l) Rated pressure of SF6 gas for operation and interruption.
- (m) Rated out of phase breaking current.
- (n) Rated supply voltage of auxiliary circuit.
- (o) Rated supply frequency of auxiliary circuits.
- (p) Purchase Order Number and Date.

The rating plate shall be visible in position of normal service and installation. The rating plate shall be weather proof and corrosion proof.

Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the BHEL/TANTRANSCO. The rating plate of each equipment shall be according to IEC requirement.

All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC equipments shall be bilingual with Hindi inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided. During approvals drawings of Rating/name plates/labels shall also be submitted.

### **3.19 TERMINAL CONNECTORS :**

The terminal connectors shall meet the following requirements.

- a. Terminal connectors shall be manufactured and tested as per IS : 5561.
- b. All castings shall be free from blow holes, surface blisters, cracks and cavities.
- c. All sharp edges and corners shall be blurred and rounded off.

- d. No part of a clamp shall be less than 10mm thick.
- e. All ferrous parts shall be hot dip galvanized conforming to IS: 2633.
- f. For bimetallic connectors, copper alloy liner of minimum thickness of 2mm shall be cast integral with Aluminium body. Flexible connectors shall be made from tinned copper.
- g. All current carrying parts shall be designed and manufactured to have a minimum contact resistance.
- h. Connectors shall be designed to be corona free in accordance with the requirements stipulated in IS : 5561.
- i. Terminal connectors shall be for Twin Moose Conductor with a spacing of 450mm between the conductor.

### **3.20 EARTHING :**

The operating mechanism housing, control cabinets, support structure etc. shall be provided with two separate earthing terminals suitable for bolted connection to 50x8mm mild steel flat to be provided for connection to station earth mat.

Circuit breakers, LA, Isolator, CVT, CT, BPI shall be provided with two grounding pads suitable for connection to galvanized steel flat of Size 75x12 mm. Control panels, Relay panel, outdoor marshalling boxes, Junction boxes, Lighting panels and distribution board shall be provided with two grounding pads, for connection to galvanized steel flat. The two pads shall be provided, one each at the middle of the two opposite sides of the bottom frame of the equipment. Earthing of hinged door shall be done by using a separate earth wire.

### **3.21 TERMINAL BLOCKS AND WIRING**

Control and instrument leads from the switchboards or from other equipment will be brought to terminal boxes or control cabinets in conduits. All Inter-phase and external connections to equipment or to control cubicles will be made through terminal blocks.

Terminal blocks shall be 1100 V grade and have continuous rating to carry the maximum expected current on the terminals. Those shall be of moulded piece complete with insulated barriers stud type terminals, washers, nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But preferably the terminal blocks shall be non-disconnecting stud type equivalent to Elmex type CATM4, Phoenix cage clamp type of Wedge or equivalent. The Insulating material of terminal block shall be nylon 6.6 which shall be free of halogens, fluorocarbons etc.

Terminal block for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

The terminal shall be that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the terminal clamp unless it is done intentionally. The conducting part in contact with cable shall preferably be tinned or silver plated however Nickel plated copper or zinc plated steel shall also be acceptable. The terminal blocks shall be of extensible design. The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

The terminal blocks shall be fully enclosed with removable covers of transparent, non-deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers. Unless otherwise specified terminal blocks shall be suitable for connecting the following conductors on each side.

|                                   |                                                 |
|-----------------------------------|-------------------------------------------------|
| All circuits except CT circuits : | Minimum of 2 nos. of 2.5 sq.mm.copper flexible. |
|-----------------------------------|-------------------------------------------------|

|                   |                                                  |
|-------------------|--------------------------------------------------|
| All CT circuits : | Minimum of 4 nos. of 2.5 sq.mm, copper flexible. |
|-------------------|--------------------------------------------------|

The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live. At least 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

There shall be a minimum clearance of 250mm between the first bottom row of terminal block and the associated cable gland plate. Also the clearance between two rows of terminal blocks shall be a minimum of 150 mm. The Supplier shall furnish all wire, conduits and terminals for the necessary inter-phase electrical connection (where applicable) as well as between phases and common terminal boxes or control cabinets.

All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC Publications, in both longitudinal and transverse modes. The supplier shall also provide all necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment. TB sizes for incoming power supply shall be informed/confirmed during drawing approval stage.

### **3.22 CONTROL CABINETS, JUNCTION BOXES, TERMINALS BOXES AND MARSHALLING BOXES FOR OUTDOOR EQUIPMENTS**

All types of boxes, cabinets etc. shall generally conform to and be tested in accordance with IS-5039, IS-8623 or IEC-439, as applicable and the clause given below.

Control cabinet, Junction boxes, Marshalling boxes & Terminal boxes shall be made of sheet steel. Sheet steel used shall be at least 2.0 mm thick cold rolled or 2.5 mm hot rolled. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. Cabinet/boxes shall be free standing floor mounting type, wall mounting type or pedestal mounting type as per requirements.

Cabinet /boxes shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere. The quality of gaskets shall be such that it does not get damaged/cracked during the operation of the equipment.

All door, removable covers and plates shall be gasketed all around with suitably profiled Neoprene /EPDM gaskets. The gasket shall be tested in accordance with approved quality plan. The quality of gasket shall be such that it does not get damaged /cracked during the years of the equipment or its major overhaul whichever is earlier. All gasketed surfaces shall be smooth, straight and reinforced if necessary to minimize distortion and to make a tight seal. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

All boxes/cabinets shall be designed for the entry of cables from bottom by means of weather proof

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and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate projecting at least 150 mm above from the base of the Marshalling Kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland. The gland shall project at least 25mm above gland plate to prevent entry of moisture in cable crutch. Gland plate shall have provision for some future glands to be provided later, if required.

### **3.23 SPACE HEATERS**

The heater shall be suitable for continuous operation at 240 V AC supply voltage and shall be provided with on – off switch and fuse shall be provided for heater.  
One or more adequately rated, thermostatically connected heaters shall be supplied to prevent condensation in any compartment.

### **3.24 DELIVERY OF GOODS AND DOCUMENTS RELATED THERETO:**

Delivery of goods shall be made by the supplier in accordance with the terms specified by the BHEL in its schedule of requirements.

### **3.25 INCIDENTAL SERVICES:**

The Supplier is required to provide any or all the services broadly outlined in the Technical specification. Any other minor incidental service related to the scope of work like providing necessary assistance whether specifically mentioned or not must be carried out by the Supplier at his own cost. All tools, Tackles Plant etc., required for completion of above works shall be brought by the Supplier.

### **3.26 DISCREPANCIES BETWEEN DRAWING AND SPECIFICATION:**

Should there be any discrepancy between the specifications and/or schedule of prices and/or drawings or any inconsistency, error or omission in either of them, reference must be made to the BHEL/TANTRANSCO for an explanation and the Supplier will be held responsible for any errors that may occur in the work through neglect of this precaution. The explanation of the BHEL/TANTRANSCO shall be final and binding on the Supplier.

### **3.27 LIST OF DRAWINGS AND DOCUMENTS :**

The drawings for the equipments provided by the TANTRANSCO/BHEL shall be followed strictly by the bidder while designing. For the rest of the equipments, the design is in the scope of the bidder and the same got approved by the TANTRANSCO/BHEL.

The bidder shall furnish one set of relevant descriptive and illustrative published literature pamphlets and the following drawings/documents for preliminary study along with the Offer (as applicable). (Drawings, GTP, type test reports, list of past supplies etc. Drawings & documents submitted at the time of offer shall be subject to review at contract stage)

- (i) General outline drawings showing dimensions and shipping weights, quantity of insulating media, etc.
- (ii) Sectional views showing the general constructional features of the equipment (eg. Breaker drg includes operating mechanism, arcing chambers, contacts with lifting dimensions for maintenance).
- (iii) Schematic diagrams of equipment (eg. Breaker drg includes for control supervision and re-closing.)
- (iv) Structural drawing, design calculations and loading data for support structures.
- (v) Foundation drilling plan and loading data for foundation design.
- (vi) The Type Test Reports
- (vii) Bill of materials shall be furnished along with drawings.

The supplier shall, within 1 week of placement of order submit six sets of final version of all the above drawings for TANTRANSCO/BHEL approval. The TANTRANSCO/BHEL shall communicate its comments/approval on the drawings to the supplier within reasonable period. The Supplier shall, if necessary, modify the drawings and resubmit six copies of the modified drawings for TANTRANSCO/ BHEL approval within one week from the date of comments. After receipt of TANTRANSCO/BHEL approval, the supplier shall, within two weeks, submit 8 prints and two good quality reproducible of the approved drawings for TANTRANSCO/BHEL use. However the drawing approval does not absolve the supplier from complying with the terms of the specification.

The following should be supplied to each consignee circle along with the initial supply of equipments ordered.

- 1) Five copies of printed and bound volumes of operation, maintenance and erection manual in English along with the copies of approved drawings and type test reports etc.
- 2) Three sets of manuals detailed in item (1) shall be supplied to the TANTRANSCO/BHEL within one week from the date of approval of drawings.
- 3) The spares for the Equipment's ordered under the scope of the Contract should also be supplied to the consignee circle along with initial supply of the equipments.
- 4) It should be noted that if the above conditions are not fulfilled the initial payment will not be released.

**Note:** The supplier may please note that all resubmissions must incorporate, all comments given in the submission by the TANTRANSCO/BHEL failing which the submission of documents is likely to be returned. Every revision shall have a revision number, date and subject, in a revision block provided in the drawing, clearly marking the changes incorporated.

#### Following Documentation schedule to be followed

| S. No. | DESCRIPTION              | TENDER STAGE | CONTRACT STAGE FOR APPROVAL | FINAL DOCUMENTATION |     |
|--------|--------------------------|--------------|-----------------------------|---------------------|-----|
|        |                          |              | Prints                      | Prints              | CDs |
| 1      | Drawings and Data Sheets | 1            | 6                           | 10                  | 5   |
| 2      | Drawings "As Built "     | -            | -                           | 10                  |     |
| 3      | Type Test Reports        | 1            | 6                           | 10                  |     |

|   |                                   |   |   |    |  |
|---|-----------------------------------|---|---|----|--|
| 4 | Erection Manuals                  | - | 6 | 10 |  |
| 5 | Operation and Maintenance Manuals | - | 6 | 10 |  |
| 6 | Manufacturing Quality Plan        | - | 6 | 10 |  |
| 7 | Field Quality Plan                | - | 6 | 10 |  |
| 8 | Inspection Test Reports           | - | 6 | 10 |  |

**Note:** Drawings will also be submitted in CD/DVD in Latest AUTOCAD-2004 or Later version or any other CAD package along with conversion files for all major items. Final Documentation shall be submitted in bound volumes with details of Customer & Project etc. written on top.

### 3.28 QUALITY ASSURANCE PLAN :

The bidder shall invariably furnish following information along with his offer.

- (i) Statement giving list of important raw materials including but not limited to:
  - (a) Contact material
  - (b) Insulation
  - (c) Porcelain
  - (d) Sealing material
  - (e) Contactor, limit switches, etc. in control cabinet.

Name of sub-supplier for the raw materials, list of standards according to which the raw materials are tested, list of test normally carried out on raw materials in presence of bidder's representative, copies of test certificates.

- (ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.
- (iii) List of areas in manufacturing process, where such inspections are normally carried out for quality control and details of such tests and inspections.
- (iv) Special features provided in the equipment to make it maintenance free.
- (v) List of testing equipment available with the Bidder for final testing of equipments vis-à-vis, the type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in the relevant schedule i.e. schedule of deviations from specified test requirements.

The supplier shall submit following information to the TANTRANSCO/BHEL.

- 1) List of raw materials as well bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
- 2) Type test certificates of the raw material and bought out accessories.
- 3) Quality assurance plan (QAP) withhold points for TANTRANSCO/BHEL inspection. The quality assurance plan and hold points shall be discussed between the TANTRANSCO/BHEL and supplier before the QAP is finalized.

The supplier shall submit the routine test certificates of bought out items and raw material, at the time of routine testing of the fully assembled equipment.

### **3.29 TEMPERATURE RISE :**

The maximum temperature attained by any part of the equipment when in service at site under continuous full load conditions and exposed to the direct rays of the sun shall not exceed 30(/25) deg. C over an ambient of 45(/50) deg. C limits specified in relevant IEC. When the standard specify the limit of temperature rise these shall be exceeded when corrected for the difference between ambient temperature at site and that specified in the approved specifications.

No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested.

### **3.30 FITTINGS AND ACCESSORIES :**

Following is a partial list of some of the major fittings and accessories to be furnished by contractor as an integral part of the equipment.

Operation mechanism housing complete with:

- (a) Locking arrangement.
- (b) Heaters equipped with automatic thermostatic control and control switch.
- (c) Cable glands.
- (d) Local/Remote change over switch.
- (e) Operation Counter.
- (f) Terminal Blocks.
- (g) Control switches to cut off control power supply.
- (h) MCCBs/MCBs are required with permanent identification marks for protection of D.C. circuits and A.C. circuits.
- (i) Two earthing terminals.

### **3.31 PACKING AND FORWARDING:**

The equipment shall be packed in crates suitable for vertical/horizontal Transport, as the case may be and suitable to withstand handling transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit due to improper and inadequate packing and handling. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc., shall be provided. Any material found short inside the packing cases shall be supplied by supplier without any extra cost.

The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit to their final destination as indicated in the Contract and exposure to extreme temperatures, salt and precipitation etc., during transport and open storage. Packing case size and weights shall be taken into consideration wherever appropriate, the remoteness of the 'goods' final destination and absence of heavy mechanized handling facilities, at all points in transit.

The packing, marking and documentation within and outside the package shall comply strictly with

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such special requirements as shall be expressly provided for in the Contract or in any subsequent instructions issued by BHEL.

### **3.32 SPECIFICATION FOR NITRYL BUTYL RUBBER**

The gaskets are to be used in tanks exposed to Transformer mineral oil/SF6 at about 110° C.

1. Hardness should be Shore A  $70 \pm 5$ .
2. Tensile Strength should be min. 10.8N/sq.mm (Minimum)
3. Elongation strength should be 270% (Minimum)

#### **AFTER AGEING**

1. Change in weight should not be more than 10% and change in Hardness should not be more than Shore A  $\pm 10$  after 7 days aging in transformer oil.
2. There should not be any visible damages after accelerated aging of 24 hours in transformer oil of temperature 110° C.

(1.) Check List for A1: Supply of Transformer Winding Resistance Test Kit 25 amps

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                                       | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A1: Supply of Transformer Winding Resistance Test Kit 25 amps |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                                               |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                                               |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                                               |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                                      |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                                      |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                                      |         |

(1.) Check List for A1: Supply of Transformer Winding Resistance Test Kit 25 amps

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(2.) Check List for A2.1: Supply of CT / PT Analyser Kit (latest)

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                       | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A2.1: Supply of CT / PT Analyser Kit (latest) |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                               |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                               |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                               |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                      |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                      |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                      |         |

(2.) Check List for A2.1: Supply of CT / PT Analyser Kit (latest)

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(3.) Check List for A3.1: Supply of Circuit Breaker Analysing Kit ( Multi break)

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                                      | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A3.1: Supply of Circuit Breaker Analysing Kit ( Multi break) |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                                              |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                                              |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                                              |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                                     |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                                     |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                                     |         |

(3.) Check List for A3.1: Supply of Circuit Breaker Analysing Kit ( Multi break)

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(4.) Check List for A4.1: Supply of Circuit Breaker Analyzer Kit with DCRM for 400kV CB

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                                             | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A4.1: Supply of Circuit Breaker Analyzer Kit with DCRM for 400kV CB |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                                                     |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                                                     |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                                                     |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                                            |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                                            |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                                            |         |

(4.) Check List for A4.1: Supply of Circuit Breaker Analyzer Kit with DCRM for 400kV CB

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(5.) Check List for A5: Supply of Primary Injection Kit 2000 A

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                    | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A5: Supply of Primary Injection Kit 2000 A |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                            |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                            |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                            |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                   |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                   |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                   |         |

(5.) Check List for A5: Supply of Primary Injection Kit 2000 A

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(6.) Check List for A6: Supply of 10KV Digital insulation tester

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                      | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A6: Supply of 10KV Digital insulation tester |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                              |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                              |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                              |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                     |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                     |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                     |         |

(6.) Check List for A6: Supply of 10KV Digital insulation tester

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(7.) Check List for A7: Supply of 1000V hand held Digital insulation tester

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                                 | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A7: Supply of 1000V hand held Digital insulation tester |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                                         |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                                         |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                                         |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                                |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                                |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                                |         |

(7.) Check List for A7: Supply of 1000V hand held Digital insulation tester

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(8.) Check List for A8: Supply of Digital clamp on meter (true rms, AC/DC currents up to 2000A)

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                                     | Yes/ No                                                                     | Remarks |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                                     | A8: Supply of Digital clamp on meter (true rms, AC/DC currents up to 2000A) |         |
| 2.     | Name of manufactures & address<br>(of the offered instrument)                                                                                                                  |                                                                             |         |
| 3.     | Make &<br>model of offered equipment                                                                                                                                           |                                                                             |         |
| 4.     | List of leads & accessories offered<br>with instrument.                                                                                                                        |                                                                             |         |
| 5.     | Test Leads and accessories –<br>compliance to technical<br>requirement mentioned in Section-<br>1 & Section-2 of technical<br>specifications.                                  | Yes / No                                                                    |         |
| 6.     | Confirm that Technical Parameter<br>of the offered testing equipment's<br>is in line with the NIT technical<br>specification.                                                  | Yes / No                                                                    |         |
| 7.     | Confirm that instruments /<br>equipment are of reputed make<br>with established mechanism in<br>India for prompt after sales<br>services including calibration<br>capabilities | Yes / No                                                                    |         |

(8.) Check List for A8: Supply of Digital clamp on meter (true rms, AC/DC currents up to 2000A)

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(9.) Check List for A9: Supply of Hand held digital AC Current Leakage Clamp Meter 20mA-2A-200A, AC

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                      | Yes/ No                                                                         | Remarks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                      | A9: Supply of Hand held digital AC Current Leakage Clamp Meter 20mA-2A-200A, AC |         |
| 2.     | Name of manufactures & address (of the offered instrument)                                                                                                      |                                                                                 |         |
| 3.     | Make & model of offered equipment                                                                                                                               |                                                                                 |         |
| 4.     | List of leads & accessories offered with instrument.                                                                                                            |                                                                                 |         |
| 5.     | Test Leads and accessories – compliance to technical requirement mentioned in Section-1 & Section-2 of technical specifications.                                | Yes / No                                                                        |         |
| 6.     | Confirm that Technical Parameter of the offered testing equipment's is in line with the NIT technical specification.                                            | Yes / No                                                                        |         |
| 7.     | Confirm that instruments / equipment are of reputed make with established mechanism in India for prompt after sales services including calibration capabilities | Yes / No                                                                        |         |

(9.) Check List for A9: Supply of Hand held digital AC Current Leakage Clamp Meter 20mA-2A-200A, AC

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(10.) Check List for A10: Supply of Digital Multimeter 4 1/2digits to measure AC/DC Volt, Current, Capacitance, frequency

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                      | Yes/ No                                                                                              | Remarks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                      | A10: Supply of Digital Multimeter 4 1/2digits to measure AC/DC Volt, Current, Capacitance, frequency |         |
| 2.     | Name of manufactures & address (of the offered instrument)                                                                                                      |                                                                                                      |         |
| 3.     | Make & model of offered equipment                                                                                                                               |                                                                                                      |         |
| 4.     | List of leads & accessories offered with instrument.                                                                                                            |                                                                                                      |         |
| 5.     | Test Leads and accessories – compliance to technical requirement mentioned in Section-1 & Section-2 of technical specifications.                                | Yes / No                                                                                             |         |
| 6.     | Confirm that Technical Parameter of the offered testing equipment's is in line with the NIT technical specification.                                            | Yes / No                                                                                             |         |
| 7.     | Confirm that instruments / equipment are of reputed make with established mechanism in India for prompt after sales services including calibration capabilities | Yes / No                                                                                             |         |

(10.) Check List for A10: Supply of Digital Multimeter 4 1/2digits to measure AC/DC Volt, Current, Capacitance, frequency

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(11.) Check List for A11: Supply of Discharge Rod made of PVC with Copper flats & minimum 6 sq.mm cable suitable to earth 400kV Bus at Height 8 meter.

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                      | Yes/ No                                                                                                                           | Remarks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                      | A11: Supply of Discharge Rod made of PVC with Copper flats & minimum 6 sq.mm cable suitable to earth 400kV Bus at Height 8 meter. |         |
| 2.     | Name of manufactures & address (of the offered instrument)                                                                                                      |                                                                                                                                   |         |
| 3.     | Make & model of offered equipment                                                                                                                               |                                                                                                                                   |         |
| 4.     | List of leads & accessories offered with instrument.                                                                                                            |                                                                                                                                   |         |
| 5.     | Test Leads and accessories – compliance to technical requirement mentioned in Section-1 & Section-2 of technical specifications.                                | Yes / No                                                                                                                          |         |
| 6.     | Confirm that Technical Parameter of the offered testing equipment's is in line with the NIT technical specification.                                            | Yes / No                                                                                                                          |         |
| 7.     | Confirm that instruments / equipment are of reputed make with established mechanism in India for prompt after sales services including calibration capabilities | Yes / No                                                                                                                          |         |

(11.) Check List for A11: Supply of Discharge Rod made of PVC with Copper flats & minimum 6 sq.mm cable suitable to earth 400kV Bus at Height 8 meter.

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

(12.) Check List for A: Supply of Laptop PC suitable for CT / PT Analyser Kit / Circuit Breaker Analysing Kit etc

**CHECK LIST FOR TESTING EQUIPMENTS**

Put a tick mark (√) in 'YES/NO' Column if the specified requirement is met, or put a (X) mark, if the specified requirement is not met and give comments in the "Remarks" column.

| S. No. | Parameters                                                                                                                                                      | Yes/ No                                                                                      | Remarks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------|
| 1.     | Name of testing instrument                                                                                                                                      | A: Supply of Laptop PC suitable for CT / PT Analyser Kit / Circuit Breaker Analysing Kit etc |         |
| 2.     | Name of manufactures & address (of the offered instrument)                                                                                                      |                                                                                              |         |
| 3.     | Make & model of offered equipment                                                                                                                               |                                                                                              |         |
| 4.     | List of leads & accessories offered with instrument.                                                                                                            |                                                                                              |         |
| 5.     | Test Leads and accessories – compliance to technical requirement mentioned in Section-1 & Section-2 of technical specifications.                                | Yes / No                                                                                     |         |
| 6.     | Confirm that Technical Parameter of the offered testing equipment's is in line with the NIT technical specification.                                            | Yes / No                                                                                     |         |
| 7.     | Confirm that instruments / equipment are of reputed make with established mechanism in India for prompt after sales services including calibration capabilities | Yes / No                                                                                     |         |

(12.) Check List for A: Supply of Laptop PC suitable for CT / PT Analyser Kit / Circuit Breaker Analysing Kit etc

| S. No. | Parameters                                                                                                        | Yes/ No  | Remarks |
|--------|-------------------------------------------------------------------------------------------------------------------|----------|---------|
| 8.     | The test kit shall be compatible for EMI/EMC/Safety environment requirement as per IS/ IEC /Equivalent standards. | Yes / No |         |
| 9.     | There shall be no licensing limitation of time for usage of the test kit.                                         | Yes / No |         |
| 10.    | <b>Following Document to be enclosed</b>                                                                          |          |         |
| 8.1    | Catalogue and data sheet                                                                                          | Yes / No |         |
| 8.2    | List of Past supplies in India & abroad for the offered equipment                                                 | Yes / No |         |
| 8.3    | Authorized Distributor Certificate from original Manufacturer / OEM attached                                      | Yes / No |         |
| 8.4    | Test Certificate / Reports                                                                                        | Yes / No |         |
| 8.6    | Undertaking to address issue of warranty / after sales services from OEM in the event of order                    | Yes / No |         |
| 8.7    | List of Deviations if any submitted in Deviation schedule.                                                        | Yes / No |         |

**Note – Check list to be filled for each individual testing equipment's quoted.**

**Name & Sign of Authorized Signatory**

**Name of Bidder**

**Mobile / Phone No**

**SCHEDULE OF TECHNICAL DEVIATIONS**

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

| S.No. | Page No. | Clause No. | Deviation | Reason / Justification |
|-------|----------|------------|-----------|------------------------|
|-------|----------|------------|-----------|------------------------|

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Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date:

Tenderer's Stamp & Signature