

TECHNICAL SPECIFICATION OF 20 POSITION FULLY AUTOMATIC METER TEST BENCH WITH REFERENCE METER OF CLASS 0.02 under TN-2617

1. OBJECTIVE:

To provide facilities for doing routine, acceptance and certification test (error test and dial test) on 1 phase, 3 phase whole current, 3 phase CT/PT operated Energy meters. Electricity meters of class 0.2S, 0.5S, 1 and 2.0 available with utility can be tested (electronic and electromechanical type). The test system shall be capable of communicating with the IS15959/IS16444 compliant Smart meters mounted on the each positions over the meter's optical port simultaneously. The necessary optical head shall be provided for each position on the test system. Response from each connected meter shall be received by associated test system software and reporting of each sent command along with response received from communicable meter shall be done by associated test system software

2. SCOPE:

Supply, installation and commissioning of 20 position fully Automatic Electronic Meter Testing Equipment with reference Meter of Accuracy Class 0.02. In addition to above, bidder shall also be required to provide:

1. Operations & Maintenance Manuals including drawings. 1 set in hardcopy along with equipment and 1 set in DVD in the form of soft. Soft Copy of all the manuals and drawings of test bench.
2. Training to purchasers employees on all aspects of operation and maintenance.
3. Continued technical support during guarantee period.
4. The major components of the test bench like source, reference standard meter should be from same make i.e. supplier's own product.
5. Handholding for 6 months from date of installation & commissioning shall be done by the successful bidder. The bidder shall depute their representative to operate the system for a period of six months at NIGAM Laboratories having an educational qualification of a Diploma in Engineering or equivalent Certificate holder. The normal working hours, weekly holidays and holidays of laboratory will be as per prevailing NIGAM regulations
6. Uninterruptible Power System
The offered Test Bench can be worked/connected with UPS with following specifications.
 - Rating : 15KVA
 - Type : IGBT Based UPS System

- THD :<2.0%
- Back Up : Minimum ½ hr. on full load
- Input Supply : Three Phase(3X230V+/-10%,50Hz)
- Warranty : 1 year

3. OPERATING CONDITIONS:

The meter test equipment shall be suitable for giving an uninterrupted service in following conditions:

- a) Ambient temperature (+) 5°C to (+) 50°C for operation and from (-) 5°C to (+) 60°C for storage.
- b) Relative humidity <95% non-condensing.
- c) Cabinet for source must be dust proof.
- d) Mains voltage shall be 3x230V±10% for three phase supply.
- e) Frequency 50Hz ± 5%.

4. APPLICABLE STANDARD: All below mentioned standards with latest amendments shall prevail.

| Purpose | Applicable |
|---|---|
| Meter Testing | IEC 62052-11, 62053-11, 21, 22, 23, <u>IS 13779:1999, IS 14697:1999, IS 16444: part 1 & 2 (with latest amendments), IS 15884 (with latest amendment) CBIP report no. 88</u> |
| Safety | IEC 61010 |
| Meter Testing Equipment | IEC 60736, 62057-1 IS 12346, IS15707 |
| Basic environmental testing procedure for electronic & electrical items | IS 9000, <u>IEC 62052-11</u> |

5. TEST TO BE PERFORMED:

The offered meter-testing system shall be specifically capable to perform at least the following tests on all types of energy meters, RSS and ERSS described in clause 1 of this specification as per IS: 14697, IS- 16444 (Part 1) and IS: 13779 and / or, IEC 62052- 11, 62053-11, 62053- 21, 62053- 22 and 62053-23 using frequency output / LED /LCD pulse output method:

- a) Pre-warming
- b) Accuracy test as per BIS/IEC
- c) Starting current test(Test of starting condition)
- d) Test of no load condition(Creep test)
- e) Dial/Meter constant test
- f) Influence quantity tests related to accuracy test
- Voltage, Frequency, Reverse Phase Sequence and Voltage Unbalance
- Influence of Harmonics component in voltage and current circuits, odd and sub harmonics.
- Simulation of tamper conditions as per specifications of Various type of static meters purchased by JVVNL.
- g) The offered system shall be capable for testing/calibration of LTCT operated meters with & without using ICTs (isolation current transformers) & CT-PT operated meters also . Required cables shall be provided along with the test bench.
- (h) Accuracy testing of reference standard used into test system against high precision reference standard
- (i) Accuracy testing of reference standard (low accuracy) against the built in reference standard.
- (j) The offered system shall be capable for testing/calibration of ABT panel mounted meters. Required cables set shall be provided with the test bench.
- (k) The offered system shall be capable for Testing of communicable Smart meters-
 - Communicate with Smart meter on its Optical Port
 - Communicate with Smart meter on its RF communication port
 - Verification of Smart meter functionality for Routine test.
 - Provision for Burden measurement of the smart meter.
 - Verification of electrical tamper conditions
 - Stress test
 - Automated testing of Communication

6. CONSTRUCTION AND COMPONENT OF SYSTEM:

The complete system shall consist of at least the following essential components, the specifications of which are defined hereinafter in this document:

A source, which shall be microprocessor-based, modular type, compact in design & easily accessible in-built Voltage Amplifier and Current Amplifiers, specifications of which are given subsequently in this specification as per clause nos. 8 and 9 respectively.

- a) Three Phase Reference Meter (ERSS) – clause 10
- b) Meter Mounting Rack with error display units – clause 12 & 13
- c) Windows based software to operate the system - clause 19

Cooling fans of suitable capacity shall be provided to avoid temperature increase inside the cabinet during normal operation.

The cabinet shall have protective earth terminals which shall be earthed during installation at site. The cabinet shall have one mains-switch to switch-off the incoming power supply. The cabinet shall also be protected against overload, thermal, under voltage and over voltage through suitable protection devices.

Power Factor compensation shall be provided as per IEC 60555 so that the meter-testing system shall draw purely sinusoidal current from the mains A.C. supply without polluting it.

7. CONTROLLER:

7.1 The Controller shall receive information for setting from PC and delivers waveforms and phase angles to the amplifiers. It shall be easily programmable so as to give:

- a) Reference output frequency independent of mains, with quartz controlled operation range from 45 Hz. to 65 Hz. in steps of 0.01 Hz. with high efficiency, power-factor compensation according to IEC 60555.
- b) Stability at inductive, capacitive and non-linear loads for the power factor.
- c) Superimposition of harmonics in the range of 2nd to 21st harmonics.
- d) Any power factor in all 4 quadrants , 0 to 360 degree shall be available for phase adjustment:
- (e) Protection against overload and short circuit
- (f) Star system (phase angle 120°)
- (g) Any asymmetrical system.
- (h) Computer controlled adjustment of star system (120°) or asymmetrical system in steps of 0.01°.
- (i) Any non-balanced system

7.2 Additional facility;:-

Bench should be equipped with the provision so that Magnet test (Permanent/AC & DC Magnet up to 0.5T) as per requirement of IS & CBIP & DC Immunity test on EUT may be carried out without disturbing the accuracy & influence the functionality of bench

8. SPECIFICATION OF VOLTAGE AMPLIFIER:

The voltage amplifier used in the Source shall be a digital resonant switch mode voltage amplifier. It should have output VA burden rating not less than 500VA/phase. The voltage amplifier should have following capabilities and features:

- a. Electronic protection against Overload and Short Circuit

- b. Digital controlled via RS 232/ RS485 connections / optical RF (compatible for smart meter testing).
- c. Efficiency better than 85%.
- d. Stability 50 ppm / h with integration time of 60 seconds (range 30 to 300V P-N)
- e. Distortion factor <0.5 %
- f. Provision for superimposition of single and multiple harmonics up to 40% of the Fundamental wave over range 2nd to 21st Harmonics in steps of 1% or better.
- g. Test & working voltage range should be in : 30 - 300 V (Phase-Neutral).
- h. Accuracy of the test setting amplitude <0.05 %
- i. Accuracy of the test setting phase adjustment <0.01 °

9. SPECIFICATION OF CURRENT AMPLIFIER : The current amplifiers used in the Source shall be digital resonant switch mode type amplifiers. It should have output VA burden rating not less than 2000 VA/ phase for 20 position. The current amplifiers should have following capabilities and features:

- a. Electronic protection against Overload, open & short circuit.
- b. LED indications for different faults such as overload, open-circuit , failure of power supply
- c. Efficiency better than 85%.
- d. Stability 50 ppm / h with integration time of 60 seconds (range 10 mA to 120 A)
- e. Accuracy of the test setting amplitude < 0.05 %
- f. Accuracy of the test setting phase adjustment < 0.01 °
- g. Distortion factor <0.5 %
- h. Test Current range 5 mA to 120 Amps. and facility to generate starting current in the range of 1 mA to 50 mA.
- i. Digital controlled via RS-232/ RS 485 connections / optical / RF
- j. Provision for super- imposition of harmonics in the range of 2nd to 40th harmonics 40st Harmonics in steps of 1% or better.

Note:- Here defined VA rating of current amplifier are just indicative, however manufacturer/supplier has to ensure that meter test bench is capable to run fully at maximum 120A current for 2hrs without any damaging and degradation of any performance of it.

10. SPECIFICATION OF ELECTRONIC REFERENCE STANDARD:

The class of accuracy of reference standard shall be 0.02% for active and reactive ranges, over the entire measurement load range & independent of the measuring mode. Current range of reference standard shall be 1mA... 120 A direct connected

and voltage range from Working range:- 5 -300 V (Phase-Neutral) and 50- 520V. (Phase to Phase), selectable through PC.

Reference standard shall have auto-range selection facility and facility of dial test (power dosing) and RS 232/RS 485 serial communication port for communicating with PC. It must frequency output proportional to the power/energy to calibrate against better standard.

Technical Data of Reference Standard Meter

a) Measuring modes

- 3 wire active / reactive mode
- 3 wire apparent
- 4 wire active / reactive mode
- 4 wire apparent
- 1 phase 2 wire active mode

b) Frequency Range

Basic frequency 45...65 Hz and total detectable frequency range 0...3500 Hz

c) Voltage Range

Working range:- 5 -300 V (Phase-Neutral) and 8... 520V. (Phase to Phase),

d) Current Ranges

- 1 mA to 120 Amps. (working range)
- 10 mA to 120 Amps. (measurement range)

e) Accuracy

- Voltage : 0.01 % for the range of voltage :-30 -300 V (Phase-Neutral) and 50 ... 520V. (Phase to Phase),
- Current : 0.01 % (10 mA to 120 A)
- Power / Energy (For active and reactive)
 - : 0.02 % at $\cos\phi = 1$ or $\sin\phi = 1$ (10 mA to 120A)
 - : 0.04 % at $\cos\phi = 0.5$ or $\sin\phi = 0.5$ (10 mA to 120A)
 - : 0.08 % at $\cos\phi = 0.25$ or $\sin\phi = 0.25$ (10 mA to 120A)

The Accuracy shall be same for Active and reactive measurement

- Phase Angle Accuracy < 0.01 °

A common modular cabinet shall be used for housing source and reference standard.

f) Display :

The RSM shall have following display following parameters.

- True RMS value of each voltage & current input
- Phase angle between voltage / current and defined reference
- Power factor of each phase
- Active , reactive & apparent power of each phase

- Total active , reactive & apparent power
- Phase Sequence
- Frequency
- Integration time

The selection facility shall be provided to select any parameters out of these parameters. The RSM shall have facility to maintain last setting when it is switched off.

g) Integration time

Facility to select integration time between 1 to 99 second shall be provided in the RSM.

h) Operation

Membrane key board with membranes push button / touch screen / any other suitable arrangement to operate the RSM shall be provided in the front of the RSM

i) Reference Channel

The RSM shall have facility to select reference for phase angle measurement. Selection of reference shall be provided manually & automatically.

j) Frequency output :

The bidder shall provide power proportional to frequency output to calibrate the reference standard against high precision reference standard. The output shall be in commonly used BNC type socket.

k) Temperature Coefficient:

Temperature coefficient of the reference meter will be <10 ppm /K.

l) Calibration:

The reference meter shall be provided along with calibration certificate from national/international accredited laboratory. The bidder shall also arrange periodical calibration (once in a year) of reference standard meter from national/internationally accredited laboratory for the tenure of 5 years from the date of satisfactory commissioning.

11. SPECIFICATION OF HARMONIC INJECTION UNIT:

Over the range 2nd to the 20th harmonics to the test voltage and test current, the magnitude of each harmonic shall be adjustable from 0-40% of the fundamental wave and the maximum peak value of the wave form shall be 130% of the magnitude of the fundamental wave. Facility of controlling the phase angle of harmonics shall also be provided. Necessary proof for generation of wave form and desired harmonics shall be submitted along with offer. The offered Equipment shall be capable to generate sub harmonics (as per clause no. 8.2 of IEC62053-21,22, 23), odd harmonics (as per clause no. 8.2 of IEC62053-21, 22, 23), voltage dips and interruption test (as per clause no. 7.1.2 of IEC62052-11).

12. SPECIFICATION OF METER MOUNTING RACK:

- a) Two No. of separate Meter Mounting Racks shall consist of a lightweight aluminum frame for mounting of sensor heads, display devices and meters-under-test as per requirement. Two racks with 10 positions each shall be supplied with a provision to place, back to back or at L shape or parallel as and when required.
- b) Meters-under-test shall get connected to the voltage and current circuits by means of connecting leads.
- c) Design of the frames should be such that either 10 Nos. single phase or three phase, 3 wire or 4 wire, whole-current or CT-VT operated meter can be mount in one row. The Reference Standard, Power Source, CPU and other components of test bench shall be fixed inside of one rack. Also ICTs for each position will be inside of the test rack.
- d) There should be a warning lamp and two emergency push-buttons fitted on each side of each Meter Mounting Rack.
- e) Each meter test position should have communication facility to communicate with meter under test using DLMS, IEC1107, IEC 62056 communication.
- f) Each meter test position should have intelligent meter disconnection / disable system which allows user to remove meter safety from any position while testing is going on and without affecting the other meter under test. Necessary stop button at each test position or software should have provision for the control.
- g) At least one BNC type of socket should be available to test low accuracy class portable reference standard; and also used for calibrating the entire test system. Error calculator and software should have necessary provision to support this task.

13. SPECIFICATION OF SCANNING HEADS AND ERROR INDICATION AND CALCULATION UNITS :

- a. 1 photoelectric scanning head for each position suitable for sensing the LED&LCD pulse output of the meters-under-test shall be provided.
- b. Scanning head shall have mechanical type fixing arrangement each scanning head should be designed in such a way that the scanning head can be fixed easily (manually adjustable) in a position which would facilitate accurate and proper testing of the meter-under-test.
- c. The scanning head should be insensitive to ambient light, magnetic field(Permanent/AC-DC Magnet upto 0.5 T), vibration & noise. Suitable provision shall be provided with scanning head. It should give optical indication of pulses by LED.
- d. The scanning head must be able to measure LED pulse output (as per IEC 62052-11, clause 5.11) of frequency up to 1 kHz.

An Error Indication and calculation device shall be mounted on each test position. The resolution of error indication shall be 4 ½ digits with decimal point configurable by software. The Error display of Multi-color graphical shall be clearly visible at angle of 170 deg.

14. SPECIFICATION OF DIGITAL PROCESS UNIT:

For the simultaneous error measurement of 20 meters under test, the basic unit shall be equipped with:

- a) 20 inputs for scanning head pulses for each meter positions.
- b) 1 input for reference output
- c) 1 interface for connection with PC.

15. HAND HELD UNIT (HHU):

Hand held unit for reading bar coded meter particulars with associated software which will automatically integrate meter particulars with the testing software. The HHU connection to the PC shall be wired. The HHU shall be laser scan type. The HHU charging device shall be rugged i.e. the charging pins must be robust enough so as to ensure proper charging.

16. ISOLATING CURRENT TRANSFORMER (ICT) & Multi Secondary Voltage Transformer(MSVT) :

The meter test system shall have isolating current transformer (ICT) to test three phase as well as single phase closed link whole current meters.

Technical details of ICTs are.

Nominal Primary current I_{prim} 100A

Maximum Primary current 120A

Nominal Secondary current I_{sec} 100A

Maximum Secondary current 120A

VA rating 50VA @ Nominal current (120 Amp) with single turn in operation

Accuracy ratio error $\pm 0.01\%$ (1 A to 120 A)

$\pm 0.02\%$ (0.01 A to <1 A)

Phase angle error ± 1 min (1 A to 120 A)

± 2 min (0.01 A to <1 A)

Max Operating Burden $3m\Omega$ for every meter position

- There shall be provision to bypass the individual ICT automatically when secondary of ICT is kept open. Sufficient protection shall be provided to protect the ICT in case if secondary of ICT remain open while full load is running in primary.
- Secondary of ICT shall be designed in such a way that its secondary leads can be connected directly to Meter under Test. Wound type ICTs only will be allowed.
- Primary connection of ICT should be fixed type and all primary connection on each ICT terminal shall be connected permanently. Primary & Secondary leads of ICT shall be wounded on core with multiple turns & should be designed in such a way that it can carry its maximum Current i.e. 120A for 2 hours continuously without any malfunction in ICT.
- Overall accuracy of entire test system (including ICT) at each meter test position should not be more than class 0.03%. at UPF and 0.06 % at 0.5lag/lead PF and 0.12 % for 0.25 lag/lead PF.
- LED indication shall be provided on ICT to indicate healthiness of ICT.
- Associate Software shall have facility to indicate fault in ICT like open circuit and over load on PC. It should have facility to display message on computer screen about any fault in ICT during testing of meters.

MSVT is required for isolation in voltage circuit for testing single phase whole current meter dual channel with IP link short. The following provision will be required:-

1 Nos. MSVT shall provide isolation in voltage circuit for testing of single phase meters with IP link short. The MSVT shall have single Primary and 22 nos. of secondary for 22 points table. Individual MSVT for each location will not be acceptable.

MSVT shall have accuracy as below:

| Parameter | Value |
|--|--|
| No. of windings | 22 for each point table |
| Primary Voltage | 90V...300V, 45...65 Hz |
| Secondary Voltage | 90V...300V |
| Range of secondary burden per position | 4...15 VA |
| Error between primary and secondary | $\leq \pm 0.1\%$, $\leq \pm 2$ minutes |
| Error between the secondary windings, concerning the above mentioned range of secondary burden | $\leq \pm 0.05\%$, $\leq \pm 1$ minutes |

One sample certificate of ICT and MSVT shall be submitted along with offer.

Detailed catalogue and Certificate from accredited lab to prove the asked accuracy of offered ICT & MSVT and its working principle of these both parts i.e. MSVT and ICT's shall be submitted along with offer(own make).

17. CONNECTION CABLES:

Apart from connection cable required to install and commission the meter test system itself, supplier shall provide the following set of connection cable for meter under test

| Requirement / Meter Type | Qty. (minimum) for 20 position bench |
|---|--|
| Voltage connection cables for phase (one side with omega pin/crocodile and other side with 4mm safety plug i.e. connection to test bench) | 80 nos |
| Voltage connection cables for neutral (one side with straight pin and other side with 4mm safety plug i.e. connection to test bench) | 40nos. |
| Current connection cables for testing of 3 phase 4 wire CT-VT operated meters both side pin type lug to test without ICT | 54nos. |
| Current connection cables for testing of 3 phase 4 wire CT-VT operated meters and for whole current meters one side pin type lug and other side connection to test bench to test without ICT | 6 nos. for main & 6 nos. for load and 6 Nos. for WCM |
| Looping colored current cables (for R, Y & B phase) of 2.5 sq. mm dia. with spade type lugs for testing of 10nos. of ABT rack mounted type meters. | 6 set |
| Current connection cables for testing of 3 phase 4 wire and 1 phase 2 wire Energy meter (for 20 Nos. meter) one side pin type lug along with voltage cable to test with MSVT and ICT and other side connection to test bench to test with ICT | 60 nos. |
| Current connection cables for testing of 3 phase 4 wire and 1 phase 2 wire Energy meter (for 20 Nos. meter) one side pin type lug and other side connection to test bench to test with ICT | 60 nos. |
| Voltage and Current Connection cables for testing one no. ERSS at one time. | 4 nos. for voltage and 6 nos. for current |

Note: Closed link Direct Connected meters shall be directly connected to the secondary connection of ICTs.

18. TESTING FACILITIES FOR COMMUNICATION COMMAND FOR SMART METERS/ DLMS METERS:

18.1. COMMUNICATE WITH ALL CONNECTED SMART METERS ON ITS OPTICAL PORT MOUNTED ON THE TEST BENCH.

The test system shall be capable of communicating with the IS15959 /IS16444 compliant Smart meters mounted on the each positions over the meter's optical port simultaneously. The necessary optical head shall be provided for each position on the test system. Response from each connected meter shall be received by associated test system software and reporting of each sent command along with response received from communicable meter shall be done by associated test system software.

18.2. COMMUNICATE WITH SMART METER OVER ITS RF COMMUNICATION PORT.

The Test bench shall be integrated with RF (Network Interface Card) for communication with all connected Smart Meters. Response from each connected meter shall be received by associated test system software using RF communication medium. The received output can be compared with the response received from the optical ports for each connected meter. The facility shall be provided in the associate test software to log and analyze each sent command and response received from each energy meters.

18.3. FUNCTIONAL TEST

The Test system shall perform all the routine functional test as mentioned below simultaneously on all connected meters on the test bench over the optical and RF port.

a) AS PER TABLE A30 OF IS15959 PART2 AND TABLE 29 OF IS15959 PART3

i. ASSOCIATIONS

The associated test system software shall have facility to check object list of the current association of all connected smart meters on meter test bench. The test shall be conducted using each association at a time such as Public Client, MR and USvia optical and RF port by sending OBIS code to read the object list. The report for each association shall be generated for its accessible attributes i.e. object list using associated test system software.

ii. DATA READ

The associated test system software shall have facility for selecting any five or more readouts from instantaneous parameter list table of IS15959 Part 2 (Table A1 and Table

A14) and IS15959 Part3 (Table 1 and Table 14). The user can select/ deselect the random parameters from the instantaneous parameters list table as per requirement of the specification using associated test system software. The test shall be conducted using any suitable association such as MR and US via optical and RF port and sending OBIS code command for individual parameter read (instantaneous Voltage, PF, frequency, energy etc.). The report for each readout shall be generated for its response from the smart meter using associated test system software.

iii. CONNECT/DISCONNECT

The associated test system software shall have facility to readout the status of connect /disconnect state of all connected meters simultaneously with the test bench.

The test shall be conducted using any suitable association such as MR and US via optical and RF port and sending OBIS code command for reading the status of load switch. The report for readout status of load switch shall be generated using associated test system software.

b) NAME PLATE DETAILS

The associated test bench software shall communicate with the smart meter to read its name plate details as per corresponding table of IS 15959 Part2 (Table A12 and A26), IS15959 Part3 (Table 12 and Table 25). The test shall be conducted once the HDLC connection is established between client and server using any association at a time such as Public Client, MR and US via optical and RF port and sending OBIS code command for name plate details (Serial No. manufacturer year etc.). The report for response i.e. readout of nameplate details from the smart meter for each OBIS code shall be generated using associated test system software.

18.4. PROVISION FOR BURDEN MEASUREMENT OF THE SMART METER:

The test bench shall have facility to measure burden (power consumption) as per clause no 6.10.1 of IS16444 (part 1 and 2) using suitable methods:

The power consumption in voltage circuit has to be measured in following conditions:

1. During idle mode of communication module
2. If a separate module to service a IHD is present
3. During data transmission per communication module.

Under each of above mentioned condition the burden measurement in the voltage circuit shall be performed and reported using associated test system software.

18.5. VERIFICATION OF ELECTRICAL TAMPER CONDITIONS.

Following Electrical Tamper conditions shall be created for its occurrence and restoration by the test bench.

The created event shall be verified over the optical and RF port for connected meters against the test conditions simulated by operator. These tests shall run in automatic mode simultaneously for all connected meters on test bench. Test shall be performed for both occurrence and restoration of corresponding tamper condition.

- Voltage missing
- Low voltage in any phase
- Voltage unbalance
- Current missing
- Current reversal
- Current unbalance

The associated test bench software shall have the possibility to compare the response received over RF with the response received over the Optical port, from the same connected Smart meter on the test bench. The report shall be generated based on the comparison of the above test and shall clearly indicate whether the result are similar or different.

18.6. STRESS TEST

Test bench shall be able to create the metrological stress conditions to all connected meters on the test bench as mentioned below:-

- 10% of 3rd harmonics in phase in current, As per IS13779/14697
- 10% 5th harmonics in voltage and 40% of 5th harmonics in current,
- 120% of Vref, As per IS13779/14697
- Imax applied to the meter, As per IS13779/14697
- 60% of Vref,
- frequency variation +10%
- frequency variation -10%
- low PF such as 0.1PF

All above conditions shall be simulated by test system and the communication of the smart meter shall be verified in the influenced conditions through performing functional

test as per above clause no. 18.0 The associate test system software shall having facility to report any discrepancy in the response from meter in normal condition and stressed condition.

18.7. AUTOMATIC TESTING OF COMMUNICATION:

The associated test bench system software shall communicate with all connected meters mounted on the test bench either as a single communication command OR combination of several communication commands included in one test sequence i.e. for meter read out and generation/simulation of the tamper conditions/ stress conditions by the test bench. The testing shall be carried out in automatic mode to test the communication correctness on both communication ports (Optical and RF) between all connected smart meters and the test bench.

19. SPECIFICATION OF COMPUTER SYSTEM (DESKTOP PC, PRINTER, MONITOR, SOFTWARES & ACCESSORIES THEREOF):

The operating of the test equipment, the display of the actual values, the processing and display of the test results and the print out of the test results, reports etc. should be effected by the associated Desktop PC (Personal Computer) system complete with licensed Windows based operating system, licensed proprietary software(including MS office) of the meter-testing equipment and a LaserJet printer having minimum specifications as given below to be supplied along with the meter testing system by the successful bidder.

The Desktop PC (PC) shall be connected to the measuring device and power source and necessary leads and cables for making these connections shall be provided by the vendor at his cost.

The licensed proprietary software of the meter-testing equipment shall be supplied installed on the PC. This software should be Windows based, user friendly and menu driven, operated with the help of a mouse and keyboard in manual or automatic mode.

The manual mode of operation of the licensed proprietary software of the meter-testing equipment shall allow, at least, performance of the following tasks:

- Controlling of the source
- displaying of test parameters (actual values) on PC screen
- displaying the wave form of output voltage and current and harmonics analysis
- Performance of the accuracy tests

The automatic mode of operation licensed proprietary software of the meter testing equipment should have different modules to prepare meter test sequence so as to carry

out the testing in fully automatic mode. These modules shall be designed in such a way that user can prepare the test sequence very easily.

The licensed proprietary software of the meter-testing equipment shall allow, at least, performance of the following tasks:

- User interface to operate the system
- Easy to prepare test-tables by using " drag & drop " concept
- Supervision and control of the test procedure
- Supervision and display of the test current and voltage
- Indication of the errors of the meters- under- test
- Evaluation of the test results and generation of test-reports
- Manual testing and automatic testing facility
- Facility to define test parameters in terms of percentage and absolute terms
- Facility to define error limit in two levels
- Facility to interrupt the testing and restart it again
- Password facility for administrator and operator with different levels
- Print out facility of test-reports with desired header
- Facility to take back-up of data
- Testing facility of at-least 20 different meters with 20 different constants
- Software shall have facility for display of different output voltages and currents
- Facility to display the curve of test voltage and current in presence of harmonics
- Protection of meters- under- test from high voltage and current

The licensed proprietary software of the meter-testing equipment shall have facility to display following parameters:

- Individual phase voltage
- Individual phase current
- Phase angle and power factor of symmetrical or asymmetrical star system
- Total Power Factor
- Individual phase power (Active , Reactive and Apparent)
- Total Power (Active , Reactive and Apparent)
- Frequency
- Phase Sequence
- Measurement mode
- Vectorial display
- Firm should have to arrange upgradation in software in case of any bug at least once in a year upto five years from date of satisfactory successful installation of testing bench failing which firms PBG may be invoked.

TECHNICAL DATA FOR PC:

| | | |
|---------------------------|---|---|
| Processor | : | Cache: 13.75 MB L3 or higher, MAX, Turbo Frequency 4.3 GHZ, 10 Core, 20 Threads or higher |
| Bus Speed | : | 8GT/s DM13 or higher |
| RAM | : | 32 GB DDR4-2666 or higher |
| HDD | : | minimum 1 TB or higher Turbo Boost Max Technology 3.0 Frequency* |
| Optical Drive | : | – |
| Keyboard & Mouse | : | USB type generic Multimedia Keyboard with 107 keys or higher and optical mouse. |
| Processor Base Frequency: | : | 3.30 GHz or higher |
| I/O ports | : | Minimum 4 high-speed USB 2.0 (2 front), Mic-In, Headphone-Out, Line- In, 2 serial, One RS-232, one HDMI, one RJ-45 minimum or better. |
| Networking | : | Onboard 10/100/1000 Mbps / Gigabit LAN Modem |
| Communications | : | Broadband ready. |
| Operating System | : | Supplied with licensed operating system Microsoft 10 Home/ Enterprises. |
| Monitor | : | 24 inches Full HD Flat LED monitor with Anti Glare Filter |
| Printer | : | All in one Laser Printer with ADF wifi, Auto Duplex Printing, Speed 27ppm or higher, print resolution min 600x600dpi |

Antivirus with 5 year free upgrade warrantee.

21. CALIBRATION AND TESTING

The equipment shall be supplied along with the manufacturer's test certificate/s of the complete meter- testing system (excluding the PC system), as well as a calibration certificate of the ERSS, valid for at least 12 months from the date of calibration. The calibration certificate of the ERSS shall be issued by any nationally or internationally recognized / accredited laboratory.

22. DOCUMENTATION

Two set of following documents shall be supplied along with each test system.

- Operating manual of test equipment.
- Wiring diagram
- Calibration certificate of reference standard
- Test certificate of complete test system

23. INSTALLATION AND COMMISSIONING

The supplier shall be responsible to install & commission the meter test equipment at the purchaser location. The supplier shall submit the layout plan, installation proposal and electric supply requirements within 4 weeks after receiving the purchase order. The Purchaser shall arrange the appropriate room, location, electric supply etc. as defined in IEC 62052-11 before the supply of the system so as to permit the smooth and proper installation of the system immediately upon its delivery to the designated location/s.

24. GUARANTEE TECHNICAL PARTICULARS:

The bidder shall furnish all the necessary information as desired in the schedule of GTP appended at Annexure-A.

25 GUARANTEE:-

The guarantee shall be for the period of 60 months from the date of satisfactory commissioning in the designated Meter lab of Jaipur Discom. The bidder shall attend the test bench within three days from the date of intimation by the concerned Meter Lab. in charge or JVVNL. In case firm does not attend to the test bench within 3 days from intimation, then the penalty as per clause of delay in delivery shall be applicable.

26 TRAINING

The supplier shall provide training on operation and maintenance of the meter test equipment to 2 Nos. engineers and 6 Nos. technical staff of Nigam for three days during installation and commissioning of the each test bench.

A refresher course shall also be arranged by the supplier during the warranty period periodically twice in a year at respective lab.

27 Delivery schedule:-

The delivery of quoted quantity should be completed in 6 months period including commencement period of 60 days.

After clearance from purchaser, the material shall be dispatched to Nigam's stores.

28. Prices:

Tenderer must quote 'FIRM' prices. The quoted prices shall be exclusive of Goods and Service Tax.. If no duty and/ or tax is applicable at concessional rate, the same shall be clearly mentioned.

29.0 PAYMENT:-As per latest amendment of GCC & ITB

70% of the payment shall be released after receipt of test bench (of complete unit) at designated meter lab and Balance 30% of payment shall be released on production of satisfactory installation and commissioning report of the concerned SE(M&P).

30. WORK COMPLETION SCHEDULE:-

The installation and commissioning of fully automatic test bench shall be completed within 45 days from the date of receipt of meter test bench at JVVNL's Lab along with intimation of location of place i.e. designated meter lab where test bench is to be installed. The concern AEn meter lab shall give intimation to the firm only after receiving the test bench to meter lab.

31. DELAY IN WORK COMPLETION:- As per latest amendment of GCC & ITB

In case of delay in installation and commissioning of test bench beyond 45 days from the date of intimation to the supplier about the designated meter lab (the date of receipt of letter about intimation of lab), penalty @ 0.5% of the cost of bench per week maximum upto 5% shall be levied, further to this, action as deemed appropriate shall also be initiated against the firm which includes invocation of bank guarantee etc.

32.0. AFTER SALES SERVICE

Bidder shall have to submit the documentary evidence of having established mechanism in India for prompt after sales services.

33.0 ADDITIONAL ORDER

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

34.0 General Information

a) Frequent changes in specifications during currency of contract will be avoided and if required the same shall be effected on mutually agreed basis.

35.0 Demonstration:

The bidder shall arrange demonstration of the tendered functionality of tendered item during technical evaluation at bidder's cost. If the bidder fail to arrange the same their bid shall not be consider for further evaluation.

Guaranteed Technical Specification of 20 position fully Automatic Electronic Meter Testing Equipment with reference Meter of Accuracy Class 0.02

| Sr. No. | Particulars | Requirement | Offered |
|---------|---|--------------|---------|
| 1. | Name and Address of the Manufacturer | | |
| 2. | Model | | |
| 3. | Country of origin | | |
| 4. | The major components of the test bench like source, reference standard meter should be from one make | As per Spec. | |
| 5. | CONTROLLER: | As per Spec. | |
| 6. | VOLTAGE AMPLIFIER: | As per Spec. | |
| 7. | CURRENT AMPLIFIER: | As per Spec. | |
| 8. | REFERENCE STANDARD METER: | As per Spec. | |
| 9. | SCANNING HEADS and ERROR INDICATION AND CALCULATION UNITS: | As per Spec. | |
| 10. | METER MOUNTING RACK: | As per Spec. | |
| 11. | ISOLATION CURRENT TRANSFORMER (ICT) & MSVT: One sample certificate of ICT and MSVT shall be submitted along with offer. Detailed catalogue and certificate from accredited Lab to prove the asked accuracy of offered ICT & MSVT and its working principle of these both parts i.e. MSVT and ICT's shall be submitted along with offer (Own make). | As per Spec. | |
| 12. | CONNECTION CABLES: | As per Spec. | |
| 13. | SOFTWARE: | As per Spec. | |
| 14. | TECHNICAL DATA FOR PC: | As per Spec. | |