Annexure-‘B’

Technical specification of NIT No. 169/PR/JBVNL/17-18

Technical specification for AC Static Single Phase, two wire, 5-30 Amp rating, whole current, class 1.0 accuracy, KWH energy meters having poly-carbonate meter case with backlit LCD display with poly- carbonate meter box.

#### 1.0 Scope:-

This specification covers the design, assembly inspection and testing before supply of AC single phase two wire solid state (static) whole current electronic energy meters of accuracy class 1.0 and current rating 5-30 Amps, with backlit LCD display as per requirement given in this specification. The above meters shall be supplied in a pilfer proof box which shall be weather proof made of poly-carbonate with flame retardant properties as per technical specification. The meter and meter box shall be supplied in suitable packing so as to withstand transit shock.

The meter should be single-phase two wires, two elements type capable to record and display energy in kwh and demand in KW for single-phase two wire AC loads for power factor range of Zero lag unity zero lead, as per requirement given in this specification.

The meter shall have facility for downloading data with proper security via optical part. The port shall be a galvanically isolated optical port. Proper data security should be available with the meters so that no data alternation of meter should be possible through the meter reading instruments and to vanish tamper informations.

It is not the intent to specify completely herein all the details of the design and construction of material. However, the material shall conform in all respects to high standards of engineering design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the right to reject any work or material which in his judgment is not in accordance therewith. The offered materials shall be compete with all components, accessories necessary for their effective and trouble free operation of the system for energy measurement. Such components shall be deemed to be within the scope of bidder’s supply irrespective of whether those are specifically bought out in this specification or not.

The offered meter shall have BIS certification i.e. the offered meters shall be ISI marked and bidder shall have to submit the notarized ISI license certificate along with the tender documents.

#### 2.0 Requirement:-

The requirement of 240 volts, 50 HZ, Single Phase, Whole current static energy meters of accuracy class

1.0 is as under:-

1. Meter with meter box- 500000Nos.
2. Service GI pipe of 1.25 inch dia, 3 meter long – 500000Nos.
3. 2core 6 sq.mm aluminium armoured cable - 20 mtr length for each energy meter
4. Fittings (Clamp, nuts & bolts, fixing screw for fixing of service pipe and meter with box for each energy meter.

**3.0 Standards Applicable:-** Unless specified elsewhere in this specification, the performance & testing of the meters shall conform to the following Indian/International standards, to be read with up todate and latest amendments/revisions thereof.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No. | Standard No. | | | | Title |
| 1 | IS 13779  amendment | and | its | latest | Specification of AC Static Watt hour meters class 1.0 & 2.0 |
| 2 | IS 15959  amendment | and | its | latest | Data Exchange for Electricity Meter, Reading, Tariff and Load Control – Companion  Specification |

Meter matching with requirements of other national or international standards which ensure equal or better performance than the standards mentioned above shall also be considered. When the equipment offered by the tenderer conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this specification shall be clearly brought out in the relevant schedule.

Manufacturer should have valid BIS License for the offered energy meters and ISI mark should be given on meter rating plate. Copy of BIS license needs to be enclosed with the tender.

**4.0 Service conditions (Climatic Conditions):-** The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions. Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climate.

|  |  |  |
| --- | --- | --- |
| 1. | Maximum ambient air temperature in shade. | 45 Deg. C |
| 2. | Relative humidity | 95%non-condensing |
| 3. | Maximum altitude above mean sea level | Up to 1000 meters. |
| 4. | Maximum wind pressure | 150 Kg/m. sq. |
| 5. | Average number of tropical monsoon (conditions)  per annum | 4 months |
| 6. | Average annual rain fall | 10 cms to 100 cms. |
| 7. | Seismic level(Horizontal accn) | 0.30g |
| 8. | Isoceraunic level (days per year) | 40 |

#### 5.0 Principal Parameters:-

The meter shall conform to following parameters:

|  |  |  |
| --- | --- | --- |
| sl # | Item | Specification |
| 1) | Type of installation | Outdoor installation (inside meter box) |
| 2) | System voltage | 240v, -40% to+20% (phase to neutral) |
| 3) | System frequency | 50 HZ ± 5% |
| 4) | No. of phases | Single phase two wire |
| 5) | System of earthing | Solidly grounded |
| 6) | Resistance to surge voltage of  1.2/50 mico-second | > 8 kv peak As per IS 13779 |
| 7) | Test voltage at 50 HZ for 1 minute | 2 kv Rms |
| 8) | Meter should be able to with stand  upto | 450V PN |

#### Technical Requirements:-

* 1. Application : 1 phase 2 wire
  2. Rated Secondary Voltage : 240 volts (Phase to Neutral)
  3. Current Rating : 05-30A
  4. Rated Frequency : 50 Hz.
  5. Accuracy class : 1.0
  6. Power Factor : Unity to Zero (all power factor lag / or lead)

The meter shall start and continue to register on application of 0.2% of basic current at Unity P.F., as per relevant standards.

#### POWER CONSUMPTION

* + 1. Voltage Circuit: The active and apparent power consumption in each voltage circuit including the power supply of meter of reference voltage, reference temperature and reference frequency shall not exceed 1 watt and 3 VA.
    2. Current Circuit: The apparent power taken by Current circuit at basic current reference and reference temperature shall not exceed 1 VA.

#### 8.0 STARTING CURRENT

The meter shall start registering energy at 0.2% of basic current at unity power factor and shall be fully functional within five seconds after the rated voltage is applied.

Running at no load: When voltage is applied and no current flows in the current circuit, the test output of the meter shall not produce more than one pulse.

#### 9.0 Supply system & Power Supply Variation:-

The supply system shall be LT 240 volts, phase to neutral, single-phase two wire. The extreme power supply variation for which an operating meter should withstand without damage and without degradation of its metrological characteristics when it is subsequently operated under its normal operating conditions shall be as follows:-

Specified operating range: 0.60 to 1.2 Vref. Limit range of operation: 0.60 to 1.2 Vref.

The limit range of error for voltage variation of +20% to -40% of Vref, shall be as under:-

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sl # | Influence quantities | Value of current | Power factor | Limits of variation in  % error |
| i) | Voltage variation between  -40% to 20% | Ib | 1  0.5 lag | 0.7  1.0 |
| ii | 10% of 3rd harmonic in  current circuit | 0.6 Ib  0.61 Max | UPF  UPF | 0.6  0.6 |

However, the bidder can offer meters which can withstand higher variations. Meter shall be able to register energy even if the voltage falls up to 60% of the rated voltage ie upto 96V.

#### General and constructional requirements:-

Meter shall be designed and constructed in such a way so as to avoid causing any danger during use and under normal conditions. The following should be ensured:-

* + 1. Personnel safety against electric shock
    2. Personnel safety against effects of excessive temperature
    3. Protection against spread of fire
    4. Protection against penetration of solid objects, dust and water
    5. Protection against fraud
    6. Protection against pilferage.

#### Meter Body (Base & Cover):-

* + 1. Meter body (base and cover) and extended terminal block cover (ETBC) shall be made of unbreakable high grade flame retardant poly carbonate with minimum thickness of 2.0 mm and of good dielectric and mechanical strength.
    2. Meter body (base and cover) and extended terminal block cover (ETBC) should be injection molded in UV stabilized poly-carbonate. The ETBC shall be kept fully transparent and the meter base shall be semi-transparent/non-transparent/opaque. The meter base should not change in color. Shape, size, dimensions when subject to 200 hrs. on UV test. It should withstand 650 degree C, glow wire test and heat defection test as per ISO 75.
    3. The manufacturer shall emboss on the terminal and cover on the name of the material they have used in an abbreviated form e.g. PCFR (to denote what they have used-flame retardant poly carbonate).
    4. The meter cover portion shall be of transparent/ translucent with transparent viewing window, unbreakable UV stabilized polycarbonate for easy reading of all the displayed valued/parameters, nameplate details and calibrating LED. It should not fade in course of time and become opaque causing inconvenience for reading.
    5. The meter cover should be ultrasonically welded with meter base. It should be supported by at least two internals locks moulded in the base/cover of the meter as well, so that even before ultrasonic welding, it is not possible to lift the cover form the base at all. With sealing provision with poly carbonate seal between meter base & cover.

The ultrasonic welding of meter case shall be such that in case of any attempt to open the meter cover from base, there should be clearly visible evidence of opening/tampering of meter case. In case the meter cover is opened the meter shall log the occurrence and restoration of same with date & time. The meter shall display the last cover open and occurrence display alongwith other parameters and temper datas.

* + 1. The meter body shall have the following properties of plastic material:-

|  |  |  |  |
| --- | --- | --- | --- |
| sl # | Property | Unit | Value |
| 1 | Physical water absorption | % | Max.  0.3 |
| 2 | Electrical Dielectric strength at 90 degree C. in oil | Kv/mm | Min.16 |
| 3 | Thermal HDT | Deg.c | Min.125 |
| 4 | Flammability   1. Rating 2. Glow wire test 650 deg.C. |  | FV 2 passes |
| 5 | Mechanical  a) Tensile strength | Mpa | Min.50 |
|  | b) Flexural strength | Mpa | Min.90 |
|  | c)Modulus of Elasticity | Mpa | Min. |
|  | d) Izod impact strength notched 23 deg.C. | KJ/sq. meter | Min.8 |

#### Terminal Block, Terminal And Extended Terminal Block cover:-

* + 1. The terminal block shall be moulded type made of non-hygroscopic, flame-retardant material having good dielectric and mechanical strength. The moulded terminal block shall be made from best quality glass filled poly carbonate conforming to IS:13779 & IES:62052-11 having adequate insulating properties and mechanical strength with brass inserts for connecting terminals.

The terminal block should satisfy all the conditions specified in IS: 13779 and IEC 62052-11. The material of the terminal block should fulfill the requirement of following tests:-

1. The flame retardant rating of Vo as per UL 94 testing.
2. The glow wire test for temperature of 960 deg. C as per IS: 11000 (part-2/sec.1) or IEC 60695-2-1.
3. Heat deflection temperature (HDT) test of 135 deg.C. as per ISO 75
4. Ball pressure test at 125 deg. C. as per IEC 60335-1.
   * 1. The base of the meter should extend to enclose the three sides (back and two sides) of the terminal block. Meter serial # shall be available at the meter name plate.
     2. The current circuit conductors of the meters shall be connected to its current terminals from inside the meter terminal block adopting procedure prescribed in either B-1 or B-2 of the recommended methods under IS: 13779. Any other method which meets these requirements in a better manner/way shall also be considered. The bidder should elaborate the arrangement adopted.

The ETBC shall be designed such that the meter’s internal parts are not accessible for tempering without breaking the seal (s). Suitable barriers in moulding shall be provided such that/direct access to incoming/outgoing terminals is not possible through gaps left in cable entry holds after insertion of main/load side cables.

The terminal cover shall be engraved/embossed/screen printed with logo of manufacturer and purchaser. The name of the purchaser JBVNL.

The terminal cover shall be provided with provision for polycarbonate tamper proof seal with suitable interlocking arrangement. The seal on meter body shall be embossed/ indelibly marked or laser etched with unique serial number, JBVNL visible from front. Provision should be made in front side of the meter terminal cover for its sealing.

#### Display Parameters and type of display:-

* + 1. The meter should have bright seven segment LCD electronic display with backlit having suitable indication for displayed parameters/ values/ character minimum height x width of 8.0 mm x 3.5 mm or higher in auto scroll mode. The meter should have 6 digits (5 complete digit and 01 decimal digit) display for reading/ measuring parameters apart from liquid display. Provision to read meter in no power condition shall be made. In any case dot matrix LCD shall not be used.

By default the meter shall continuously display only cumulative kwh, Billing kwh,and maximum demand ( Billing Demand). However, in push button mode, all parameters shall be displayed. The LCD shall be suitable for temperature withstand of 80 deg. c. (storage) and 65 deg. c. (operation). The LCD display should have a wide viewing angle of 45 deg. to 60 deg. cone, up to one meter distance.

Meter data shall not be lost in the event of power failure. The meter shall keep the energy and maximum demands recorded in its non-volatile memory independent of battery backup, so that in the event of power failure/ damage of the meter the last reading of such billing quantities should not be lost.

The display shall not be affected by electrical & mechanical disturbances. The non-volatile memory (NVM) shall have a minimum retention time of 12 years under un-powered condition i.e. the NVM shall have a storage life (without use) of 12 years. The battery back up memory will not be considered as NVM.

All important data such as calibration data, billing parameters and cumulative kwh should be stored in NVM internal to the main processing circuit and it should not be possible to change the data through any standard serial communication.

For clear visibility of the display of the meter reading at a distance, large viewing area with large display icons is preferred.

The accuracy of display parameters on LCD display for all parameters shall be matching with the accuracy class of meters as per IS.

When the meter is placed in oven at a constant temperature of 65 deg.c. for period of 30 minutes, the character of LCD should not deform.

After keeping the meters at a constant temperature of 80 deg. c. for period of 30 minutes and when restored at normal temperature, the LCD must work satisfactorily.

1. The display of various parameters shall be scrolling one after another. The meter shall be capable to measure power factors i.e. zero lag-unity zero lead. The meter should also have provision for automatic recoding of cumulative kwh at 24.00 hrs. on the last day of the month for each calendar month & the same should go to memory. However, these shall be facility to read cumulative kwh without opening the meter box.
2. Display sequence. The meters shall display the required parameters in two different modes as follows:-

#### AUTO SCROLL DISPLAY

The display of following parameters herein after referred to as “Billing Parameters” (B.P.) shall be displayed in an auto-cycle mode.

By the default the meter shall display Current cumulative active energy KWH ( without Decimal), Billing purpose active energy (BP-KWH) ( without Decimal) and Maximum demand KW (BPKW) (At pre define date & time) with display time of 10 second each

“Cumulative active energy (kWh forwarded) reading of pre-defined date an time for billing purpose (B.P. kWh) – with display time of 10 Sec.”

#### PUSH BUTTON DISPLAY

The following parameters shall be displayed, one after other, with press of push button each time. The display shall have on time of approx. 10 seconds for each measured values. Push button should be installed at the front of meter cover (re- elevate) so that reading could be taken without opening meter box.

1. LCD Segment Check
2. Real time
3. Date DD/MM/YY
4. Meter Sr. No.
5. Current cumulative Active Energy (kWh) ( withF Decimal)
6. MD of Last Month in kW.
7. Instantaneous Voltage.
8. Instantaneous Current
9. Instantaneous Load (kW)
10. Instantaneous PF
11. MD (kW) since last reset
12. Last 2 months kWh
13. Last 2 months MD
14. Last 2 months Average Power Factor.

The meter should confirm to IS:15959, DLMS complaint

#### 15.0 TIME OF USE MONITORING

The meter shall offer the capability of time of use monitoring for energy, minimum 4 register shall be capable of being configured for TOD monitoring for Peak / off peak hours.

#### SELF DIAGNOSTIC FEATUR

The meter shall be capable of performing complte self diagnostic check to monitor integrity of adata memory location at all times. The meter shall have indication for unsatisfactory/ nonfunctioning/malfunctioning of the following:-

* + 1. Time and ate
    2. Real Time clock (RTC) status
    3. Battery Status

#### Tamper and fraud protection

The meter should have tamper and fraud protection features so as to continue to register active energy accurately under the following conditions.

* + 1. On reversal (interchange) of input (line) and output (load) terminals- the reverse indication in the form of LCD and the meter shall record accurately.
    2. On reversal (interchange) of phase and neutral at the mains or incoming supply side of meter terminals-meter shall record accurately.
    3. Using earth in place of neutral (i.e. when load is not terminated back to the meter and instead current is drawing partially or fully through a local earth) irrespective of the phase and neutral connections to the meter.
    4. The meters shall be immune to tampering through application of external magnetic fields. However, tamper count will increase in case the meter is exposed to magnetic field. Besides the above, the meters accuracy or accuracy display under normal conditions shall not be affected by placement of a permanent magnet as per CBIP325, anywhere on the surface of the meters without meter box. The magnetic test shall be conducted on both phase & neutral circuit. The meter shall be CBIP325 compliant in case of any magnetic influence, wherever the meter detects the magnetic tamper the meter shall be recording at Imax.
    5. When the neutral from both incoming & outgoing side are disconnected and the load is taken through earth, the meter should record energy as per rated voltage, rated frequency and unity power factor (Lag), in proportion to the current drawn. Threshold current should not exceed 01A.
    6. In case there is any contradiction, the parameter which is technically more efficient or better in the interest of the Board shall prevail.
    7. The meter shall record energy proportional to the current and 240V when any of the tamper circuits enclosed as annexure-‘M’ are used to tamper energy using a diode or a variable resistance or a variable capacitance energy so called ENERGY SAVING DEVICE. “The measurement by meter shall not get influenced by injection of AC voltage/Chopped signal /DC signal /DC pulse of low frequency and harmonics. The meter should be immuned to such Neutral Disturbance. In case the meter accuracy is disturbed under neutral disturbance, it should be able to log the event and record energy accurately or in positive side”. Threshold value should also be provided by the supplier for variable resistance tampering below it should switchover to 240V.
    8. The meter shall be capable to record tamper kWH valued under three different condition i.e. load reversal, earthed (full or partial) and neutral loss, the energy recording in these case shall be added into the cumulative register in forward direction.
    9. Any combination of the conditions described above under (a), (b) & (c).
    10. The threshold value for different tamper features shall be as under:-

1. The starting current of main measuring element (between 1 & 4) shall be 0.2% Ib and that of neutral element (between 2 & 3) shall not exceed 0.2% of Ib under tamper condition (c).
2. The threshold value for recording of energy under tamper condition (e) above shall in no case be more than 2% Ib.
   * 1. The accuracy of the meter should not be affected with the application of abnormal voltage/frequency generating device such as spark discharge of approximately 35kv. The meter shall be tested by feeding the output of this device to meter in any of the following manner for 10 minutes. (1)One any of the phases or neutral terminals.

(2)On any connecting wires of the meter. (3)Voltage discharge with 0-10 mm spark gap (4)At any place in load circuit.

(5)Spark on meter body.

The accuracy of meter shall be checked before and after the application of above device (s) with site conditions. Meter can also log the same as tamper event along with recording of energy accurately or in positive side and also record the event as tamper with date & time stamping.

* + 1. Meter should be provided with top cover open tamper indication.

This tamper should not be accessible through any software or CMRI in any case for its resetting.

* + 1. The meter shall be immune to and adhere to EMI / EMC as per IS standard.

The bidder should furnish the details as to how their meter is able to detect/protect the above tampers and fraud with sketched and phasor diagrams. The meter must not be vulnerable to tampering in any of the situations described with three number tamper circuit enclosed as Annexure-‘M’ and shall record energy proportional to current and 240V.

#### 18.0 Sealing arrangement of the meter

The meter cover shall be permanently ultrasonically welded to the meter base. It shall not be possible to open the meter cover without permanently damaging the meter cover or base, easily visible from the front in order to make the ultrasonically welded meter base with cover full proof from tampering, two numbers of push-fit molded seals shall be provided on the meter case-cover-boundary as below:-

The meter shall be sealed with one No of specially designed and white coloured polycarbonate, numbered, tamper proof seals, to be inserted on each side of meter case, with internal locking arrangement embossed or indelibly marked or laser etched with unique serial number.

The seals shall become unserviceable and irreplaceable in case of any attempt to tamper the meter. Additionally, two sealing holes shall be given in screw, meant for assembling base & cover of meter

body of dia 2mm.

#### Electro-Magnetic Compatibility and Interference Requirement:-

The meter shall meet EMI/EMC requirement as specified in the relevant standards and shall also be protected against radiated interference from either magnetic or radio frequency sources.

The offered Single phase meter shall also withstand DC immunity test as per relevant standard so as to ensure that the meter current circuits do not saturate on passage of direct current.

The meter shall be designed in such a way that the conducted or radiated electro-magnetic disturbance as well as electro-static discharge of 35 kV do not damage or substantially influence the meter.

The disturbances (s)/discharge (s) to be considered are:-

* + 1. Harmonics
    2. Voltage dips and shot interruptions
    3. Fast transient burst test
    4. External DC and AC magnetic fields
    5. Electro-magnetic H/F fields
    6. Electro-static discharges
    7. Radio frequency interference suppression

#### 20.0 COMMUNICATION

The Meter should have a galvanically isolated optical communication port for data communication with CMRI. The Port shall be compatible with IEC 1107( in line with Indian companion specification).

The port shall be insensitive to cable orientation and successfully meter reading shall be achieved from any orientation.

Also meter shall support the open protocol (DLMS Indian companion specification-IS 15959) for relevant single phase meter data logging. For local meter reading, it shall be possible to do entire meter data download with in 2 minute (containing instantaneous values, load survey, 6 history and event)

#### Manufacturing Activities:-

* + 1. All the material, electronics and power components, ICs used in the manufacture of the meters shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.
    2. The manufacturer should use application specific integrated circuit or Micro controller for metering functions.
    3. The Electronic components shall be mounted on the printed circuit board using latest surface mounted technology (SMT) except power components by deploying automatic SMT pick and place machine and re-flow soler process.

The Electronic components used in the meter shall be of high quality and there shall be no drift in the accuracy of the meter at least up to 10 years. Further, the bidder should own or have exclusive access (through hire, lease or sub-contract) or the afore-mentioned facilities.

The above shall be verified during works inspection or material inspection also and if any ambiguity is found, it shall be considered as a breach of contract by the successful bidder. Bidder without in-house design, development and manufacturing facility as above or who are buying populated PCBs will not be considered as meter manufacturers.

The PCB material should be of glass epoxy FR-4 grade conforming to relevant standards.

* + 1. All insulating materials used in the construction of meters shall be non-hygroscopic, non- ageing and of tested quality. All parts, which are likely to develop correction, shall be effectively protected against correction by providing suitable protective coating.
    2. Quality should be ensured at the following stages:

1. At PCB manufacturing stage, each board shall be subjected to bare board testing.
2. At insertion stage, all components should undergo testing for conforming to design parameters and orientation.
3. Complete assembled and soldered PCB should undergo functional testing using test equipments (testing zig).
4. Prior to final testing and calibration, all meters shall be subjected to accelerated ageing test to eliminate infant mortality.
   * 1. The calibration of meters shall be done in-house.
     2. The bidder should submit the list of all components used in the meters along with the offer.
     3. A detailed list of bought-out items, which are used in the manufacture of the meter, should be furnished indicating the name of firms from whom these items are procured. The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought out items.
     4. The details of testing facilities available for conducting the routine and acceptance tests and other special tests on the meters shall be furnished with the bid. The facility available if any for conducting type test (s) may also be furnished.

#### Type test:-

* + 1. The type test certificates for all tests as per IS: 13779-1999/ relevant IEC standard (latest amendments) will be furnished along with tender. Applicable type test certificates from NABL accredited laboratory will be considered. Type test certificates from educational institutes or other agencies will not be accepted. Non submission of copies of type test reports shall entail rejection of bids.

The following information should be clearly mentioned in the type test reports:

1. Type of display --- LCD display.
2. Details of shunts/CT used in main and neutral circuit.
3. Accuracy at different loads and PF for both main and neutral circuit separately.

**23.0 BIS license Certificate:-** The bidders must have to submit valid copy of BIS liscence certificate, failing which tender will be rejected.

**24.0 Sampling Test:-**After delivery of meters, samples from each lot/sub-lot shall be selected and subjected to the following test (s) at purchaser’s lab. The samples shall be as per sampling plan indicated at Annexure-H of IS: 13779, (considering lot of 10000 Nos. meters if quantity offered for inspection is 20,000 Nos. if less than this lot shall remain of 5000 Nos. on pro-rata basis. The samples shall be selected & sealed by a committee constituted by the board. The samples so selected shall be sealed by seals/stickers, put in the primary packing of the meters and box (which shall be sealed by stickers seal) and then all the meters selected to be put in the primary packing corrugated box supplied with the meters and again sealed by sticker seals by the committee members. The sealed and packed boxes shall be opened and witnessed by the firm’s representative at the time of testing of such meters. The supplies shall be utilized in the field only after successful testing (in respect of under mentioned tests) of sample meters:

|  |  |  |
| --- | --- | --- |
| sl # | Particulars of tests | No. of samples to be tested  out of ……., on prorata basis. |
| i | Starting current test and No load test | 20 # |
| ii | A C High voltage test, insulation test, limits of error, test of meters  constant, power consumption test. | 8 # out of above 20 # |
| iii | Repeatability of error | 3 # out of above 8 # |
| iv | Voltage variation, tamper & fraud protection, DC immunity test, magnetic immunity test (permanent magnet test of 0.5 tesla), Accuracy test after application of 450 volts with stand test as per  5.4.6.2 of CBIP report no 304/08, Imax for 30 minutes test, DC  injection test and 35 kV high frequency high voltage test. | 3 # out of above 08 # |

**25.0 Guaranteed Technical Particulars:-** The bidder shall furnish all the necessary information as desired in the schedule of Guaranteed Technical Particulars and data, appended at annexure-‘E-II’ of this specification.

#### Inspection and Testing by inspecting officers of Board:-

* + 1. All acceptance tests as laid down in the ISS/IEC and these specifications shall be carried out.
    2. Following tests shall also be carried out as acceptance test by adopting methods specified in IS: 13779-1999/IS:9000 as per relevant IEC standard /CBIP 88 (latest amendment).

1. AC voltage test
2. Test of meters constant
3. Test of limits of error, clause 11.11 of IS: 13779 at 400% Ib, 600% Ib, 700% Ib at pf 0.5 Lag, 0.8 Lag & Unity.
4. Vibration test:- As per IS 9000 (part-8)
5. Shock test:- As per section-1 of IS 9000 (part-7).
6. Voltage variation test as per this specification.
7. Test of No load condition at 60% and 120% of rated voltage. The minimum test period shall be as per clause 8.3.2 of IEC 620053-21/2003.
8. Test of DC components in AC circuits-The limits of variation in percentage error shall be 1.75% for class-1 meter at Imax/root2 at UPF, as per annexure-D of IS: 13779-1999.
9. Diode/resistance/capacitance injection test as per clause-7.4 of this specification.
10. Accuracy test under following anti tamper conditions :

Phase neutral interchanged.

phase neutral normally connected and load earthed. Phase neutral interchanged and load earthed Supply and load side interchanged and load earthed

Supply and load side interchanged and reversed and load earthed Normal connection and with partial earth load

1. Test of MRCT on both elements in case of tamper features as per clause.7.4 of this specification.
2. Permanent magnet test- As per specified in clause 7.4 of this specification.
3. The inspecting officer shall verify that no DC supply/signal is given in reference meter during the DC injection test.
4. The accuracy of display parameters shall be verified at the time of inspection in line with class of accuracy of meter.

**27.0 Sample Meter:-**Two sample meters along with meter box conforming to this specification duly sealed along with the routine test certificates shall be submitted with techno-commercial bid free of cost. The above sample meter and meter box shall be tested in purchaser’s meter testing lab/ independent test lab in presence of firm’s representative & will not be returned to bidder. The sample shall be complete in all respects and no deviations shall be allowed for technical qualification. In case samples do not conform to the specifications, the financial bid of offer shall not be opened.

**28.0 Replacement of Defective Meters:-** The meters declared defective by the consignees and/or by meter testing lab shall be replaced by the supplier up to the full satisfaction of the purchaser at the cost of supplier as per relevant clause of general requirement of specification within one month of intimation by purchaser/stores officer.

**29.0 Performance & Guarantee:-** The meter shall be guaranteed for a period of at least five years from the date of receipt of meters at site or JBVNL stores. If the meter is found defective within the above guarantee period should be replaced/repaired by the supplier free of cost within one month of the receipt of intimation, the purchaser shall recover and equivalent amount plus 15% supervision changes.

#### Quality Assurance Plan:-

The design life of the meter shall be minimum 10 years and to prove the design life, the firm shall have at least the following quality assurance plan:-

* + 1. The factory shall be completely dust proof.
    2. The testing rooms shall be temperature and humidity controlled as per relevant standards
    3. The testing and calibrating equipments should be automatic and all test equipment shall have their valid calibration certificates, not older than one year on date of inspection.
    4. Power supplies used in testing equipment shall be distortion free with sinusoidal wave forms and maintaining constant voltage current and frequency as per the relevant standards.
    5. During the manufacturing of the meters the following checks shall be carried out:-

1. Meter frame dimensions tolerance shall be minimum
2. The assembly of parts shall be done with the help of jigs and fixtures so that human errors are eliminated.
3. The meters shall be batch tested on automatic, computerized test bench and the results shall be printed directly without any human errors.

The bidder shall invariably furnish the following information along with his bid, failing which his bid shall be liable for rejection. The information shall be separately given for individual type of material offered.

**TECHNICAL SPECIFICATION OF PILFER PROOF METER BOX TO HOUSE SINGLE PHASE ENERGY METER ( PUSH TO FIT TYPE)**

**31.0** SCOPE:

The fully transparent meter box shall be intended to house one number single-phase electronic energy meter. The meter box complies with IS: 14772:2000 with latest amendment.

**32.0** MATERIAL:

The meter box shall be made of Transparent Polycarbonate material (TPM) which complies following properties:

Meter box shall be weather proof, capable to withstanding temperatures of boiling water for 5 minutes continuously without distortion or softening. It shall withstand Glow wire test at 650C as per IS: 14772. HDT of Polycarbonate material shall be minimum 120 C (at 1.8 MPa ° C),

**33.0** CONSTRUCTION:

The meter Box shall have roof tapering down to both the sides for easy flow of rainwater. The thickness of the box shall be minimum 2.0 mm on all sides.

The cover should be fitted with base by non-detachable push fit, self locking type arrangement it should have knobs/anchors provided with the cover so that if shut/press fitted once inside the arrangement in the main body of the base, it becomes the part of the box and cannot be detached from the base without breakage.

The cover shall rest on the base of box in such a way that any access from outside to the meter is not possible. The cover in closed position should be overlapped on collar of base such that direct entry of screw driver or tool is not possible.

The top cover when opened after installation must have visible cracks/damages to make visible that the meter box has been forcibly opened up.

Minimum one snap Lock fitting arrangements must be made on both side of box. The snap fit arrangement should have adequate barriers (Except for cable entry side) around the sealing arrangement such that any attempt to reach the sealing arrangement is not possible.

There shall be no hinges in the box cover.

Meter Box should be comply with IP - 54. Type test report shall be enclosed along with offer. All metallic parts would be well protected against corrosion.

Push button arrangement shall be required on the cover of the box to operate the meter display push button from out side the meter box to read the meter display parameters without opening the meter box cover.

The provision for connecting optical probe for meter communication through meter reading instrument without opening the box seal shall be provide.

Colour: The front cover of meter box shall be transparent so that connections are visible from out side of the meter box.

Box Mounting: Box shall have minimum 3 nos. holes of 6 mm diameter for fixing the meter box on wall / SMC board.

Cable Entry: Suitable provision for is made available at the bottom side of the meter box bottom for cable inlet & outlet and the same shall be capable of accommodating cable of 16 mm diameter, engineering plastic cable gland shall be provided.

Marking:

Manufacturer name/logo and Danger sign should be embossed on the cover of Meter Box.

**34.0 Drawing**:- Detailed dimensional drawing & detailed leaflets showing clearly the dimensions & material for meter box and its constructional features should be furnished with the tender offer.

#### Tests

* + 1. **Type Tests:-**

The meter box offered shall be applicable type tested as per relevant standards and this technical specification. The bidder must furnish one set of type test reports and the dimensional drawing (duly approved by type testing agency along with the tender. The type test report should be from reputed NABL accredited laboratory as in accordance with applicable IS.

#### Acceptance tests:-

The acceptance tests shall be carried out at the time of inspection of the offered material.

#### Routine tests:-

The routine tests shall be carried out and routine test certificates/reports shall be submitted in soft copy to the purchaser’s inspecting officer at the time of inspection of the offered material.

**37.0 Inspection:-**The inspection may be carried out as per inspection clause mentioned in the tender specification.

**38.0 Guaranteed Technical Particulars:-** The bidder shall furnish all the necessary informations desired in the schedule of GTP appended with this BoQ.