WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

Technical Specification for AC 1 Phase 2 Wire 240V LT Solid State (Static) Whole Current Import - Export Energy Meter of 1.0 Class Accuracy and 5-30A Current Rating with Pilfer Proof Meter Box

1.0 SCOPE

1.1 This scope covers design, engineering, manufacture, *testing*, inspection andsupply of AC 1 Phase 2Wire 240V LT Solid State (Static) Whole Current Import – Export EnergyMeter of 1.0 Class Accuracy and 5-30A Current Rating with backlit LCD display.The meter shall be capable of recording and displaying energy in kWh & demand inkW (both in import & export mode) for power factor having the range of zero lag-unity-zero lead. Meter shall have facility /capability of recording tamper information & load survey of active energy (both import&export), apparent energy (both import & export),active & apparent demand (both import & export), phase & neutral current, phase voltage& other parameters innon volatile memory.

1.2 It is not the intent to specify completely herein all the details of the design and construction of meter.However the meter shall conform in all respect to high standards of engineering, designand workmanship and shall be capable of performing commercial operation continuously ina manner acceptable to WBSEDCL, who will interpret the meanings of drawings &specification and shall have the right to reject any work or material which in its judgment isnot in accordance herewith. The meter shall be complete with all components,accessories necessary for their effective and trouble free operation for thepurpose mentioned above. Such components shall be deemed to be within the scopeof bidder's supply irrespective of whether those are specifically mentioned or not in this specification or in the commercial order.

2.0 STANDARDS APPLICABLE: Unless specified elsewhere in this specification, the performance & testing of the metersshall conform to the following Indian / International standards, to be read with up-to-date and latest amendments / revisions thereof as on 90 days prior to floating of tender.

Sl.No.	Standard No.	Title
1	IS13779:1999 read withits latest amendments	Specification of AC Static Watt Hour meters, Class 1.0and 2.0
2	CBIP Report No. 325 & its latest amendments, if any	Specification for AC Static Electrical Energy Meters
3	IS 12346 :1988	Specification for testing equipment for AC Static Electrical Energy Meter (latest amendment)
4	IEC687 – 1992	Specification of AC Static Watt Hour meters for active energy (Class 1.0)
5	CBIP Technical Report III	Specification for Common Meter Reading Instrument
6	IS 13410 :1992 withlatest amendment	Specification for Pilfer Proof Meter box suitable for 1Phase StaticEnergy Meter
7	*IS 15959:2011 with latest amendments*	*Data exchange for electricity Meter reading, Tariff and Load Control – Indian Companion Specification.*

3.0 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 climatic conditions. The meters shall be suitably designed and treated for normal life and satisfactory operation under hot and hazardous tropical climatic conditions and shall be dust and vermin proof. All the parts and surface, which are subject to corrosion, shall either be made of such material or shall be provided with such protective finish which provides suitable protection to them from any injurious effect of excessive humidity.

3.1 Maximum Ambient Air Temperature in shade: 55^0 C
3.2 Minimum Ambient Air Temperature: (-)10^0 C
3.3 Maximum Relative Humidity: 95%(non-condensing)
3.4 Minimum Relative Humidity: 10%
3.5 Height above mean sea level: Up to 3000 meters
3.6 Average number of tropical monsoon per annum: 5 months
3.7 Annual Rainfall: 100 mm to 1500 mm
3.8 Maximum Wind Pressure : 150 Kg/Sqm

4.0 SUPPLY SYSTEM :

System	1 Phase 2 Wire
Rated voltage (V_{ref})	Phase to neutral(P-N) Voltage : 240V
Rated Current	Basic current (I_b): 5A Maximum current (I_{max}): 30A
Rated Frequency	50 Hz

5.0 POWER FACTOR RANGE: The meter shall be lag only in both import & export mode suitable for full power factor range from zero (lagging) through unity to zero (leading).

6.0 POWER SUPPLY VARIATION: The meter shall be suitable for working with following supply system variations.

System	1 Phase 2 Wire
Specified range of operation	70% to 120% of Rated Voltage i.e. 240 Volt
Frequency	50Hz $\pm$5%

7.0 ACCURACY

i. Class of accuracy of the meter shall be 1.0.
ii. Maximum error limit at 1% I_b and UPF shall not exceed ±2%.
iii. There shall be no drift in accuracy, at least for a period of ten years from the date of supply. In case any drift is noticed which is beyond the permissible limits, the supplier shall have to replace the meter with a new one free of cost.

8.0 POWER CONSUMPTION

9.1 Voltage Circuit: The active and apparent power consumption in the voltage circuit/phase at reference voltage, reference temperature and reference frequency shall be less than 1.5W / 8VA as per IS 13779.

9.2 Current Circuit: The apparent power taken by current circuit/phase at basic current, reference frequency and reference temperature shall be less than 4 VA as per IS 13779.

9.0 STARTING CURRENT & RUNNING AT NO LOAD

i. 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.

ii. Running at no load: When 70% & 120% voltage is applied and no current flows in the current circuit, the test output of the meter shall not produce more than one pulse.

10.0 MAXIMUM CONTINUOUS CURRENT :

The maximum continuous current in meters shall be the current at which the meter purports to meet the accuracy requirement of the specification. The same is indicated in table in Supply System Clause of this specification.

11.0 CONSTRUCTION :

i. The case, winding, voltage circuit, sealing arrangements, registers, terminal block, terminal cover & name plate etc. shall be in accordance with the relevant standards. The meter shall be compact & reliable in design, easy to transport & immune tovibration & shock involved in the transportation & handling. The construction of the meter shall ensure consistence in performance under all conditions especially during heavy rains / very hot weathers. The insulating materials used in the meter shall be non-hygroscopic, non-ageing & have tested quality. The meter shall be sealed in such a way that the internal parts of the meter becomes inaccessible and attempts to open the meter shall result in viable damage to the meter cover i.e. break to open type. This is tobe achieved by using continuous Ultrasonic welding (or by using any other technology which is either equally or more efficacious) on all the four sides of themeter base and cover.

ii. The meter shallcomplylatest technology such as Microcircuit or Application Specific Integrated Circuit (ASIC) to ensure reliable performance. The mounting of the components on the PCB shall compulsorily be Surface Mounted Technology (SMT) type. Power supply component may be of PTH type. The electronic components used in the meter shall be of high quality and there shall be no drift in the accuracy of the meter for at least ten years. The circuitry of the meter shall be compatible with 16 Bit (or better) ASIC with compatible processor and meter shall be based on Digital measuring and sampling technique.

iii. The meter shall be housed in a safe, high grade, unbreakable, fire resistant, UV stabilized,virgin Polycarbonate casing of projection mounting type. The meter cover shall be transparent / translucent. But the viewing portion shall be transparent for easy reading of displayed parameters, and observation of operation indicators. The meter base may not be transparent, but it shall not be black in colour. The meter casing shall not change in shape, colour, size and dimensions when subjected to 72 hrs on UV test as per ASTMD 53.It shall withstand 650℃ glow wire test and heat deflection test as per ISO 75 or as per IEC 60068 -2-5.

iv. In addition to the above, the meter cover shall be sealable to the meter base with at least 2 no. of bar coded seals bearing the identification marks of the manufacturer. Suitable arrangement shall be made for fitting/fixing of utility seal at two sides of meter terminal cover in such a manner that any access to the terminal cannot be made possible without removing the seal. There shall also be provision for sealing at the optical port.

v. The polycarbonate material of only the following manufacturers shall be used:

11.v.1 **G.E. Plastic :**LEXAN 943A or equivalent like 943, 123R for meter cover & terminal cover / LEXAN 503R or equivalent like 500, 143R for meter base and terminal block.
11.v.2 **BAYER :** Grade corresponding to above
11.v.3 **DOW Chemical : --do--**
11.v.4 **MITSUBISHI : --do--**
11.v.5 **TEJIN : --do--**
11.v.6 **DUPONT : --do—**

12.0 METER CASE AND COVER :

i. In case, ultrasonic welding using plate / strip is used, the material of plate / strip shall be same as that of cover and base and the strip. The manufacturer's logo shall be embossed on the strip / plate. The material of the meter body (case and cover) shall be of Engineering Plastic.

ii. The meter cover shall be fixed to the meter base (case) with Unidirectional Screws, so that the same cannot be opened by use of screwdrivers. These unidirectional screws shall be covered with transparent caps (not required for screw less design), ultrasonically welded with the meter body and the screw covers shall be embedded in the meter body in a groove. The meter shall withstand external magnetic influence as per latest amendments of CBIP Technical Report No.325 including 0.2T AC Magnet, 0.5T Permanent magnet.

13.0 TERMINAL BLOCK AND COVER:

i. The terminals may be grouped in a terminal block having adequate insulating properties and mechanical strength. The terminal block shall be made from best quality non-hygroscopic, flame retardant material (capable of passing the flammability tests) with nickel plated brass inserts / alloy inserts for connecting terminals. It shallbe rigidly fixed to the base of the meter so that it cannot be separated from the meter base without breaking either the meter base or the terminal block and this fixing arrangement shall be in parallel to the meter base in such a way that it cannot be viewed or approached from any part of the meter without breaking the meter.

ii. The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor. The screws shall have thread size not less than M4 and head having 6 mm diameters. The screws shall not have pointed ends at the end of threads.All terminals and connecting screws and washers shall be of tinned / nickel plated brass material. The terminal shall withstand glow wire test at 960℃$\pm$ 15℃and the terminal shall withstand at least 135℃as per IS.

iii. The internal diameter of terminal hole shall be minimum 5.5 mm and center to center distance is 13 mm. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also.

iv. The terminal cover shall be transparent re-enforced Polycarbonate, Engineering Plastic with minimum thickness 2.0 mm and the terminal cover shall be of extended type completely covering the terminal block and fixing holes. The space inside the terminal cover shall be sufficient to accommodate adequate length of external cables.

v. The terminals and all connecting screws will be of suitable material capable of withstanding a current of 150% of I_{max} for two hours, continuously and the meter shall be capable of providing phase to neutral protection up to 433V for 1(one) hour.

14.0 MARKING OF THE METER :

The marking on the meter shall be in accordance with relevant clauses of IS 13779.The basic marking on the meter nameplate shall be as follows. Allother markings as per IS shall also be there.

i. Manufacturer's name & trade mark
ii. Type Designation
iii. No. of phases & wires
iv. Serial number (Size not less than 5mm)
v. Month & year of manufacture
vi. Reference Voltage
vii. Rated Current
viii. Operating Frequency
ix. Principal unit(s) of measurement

x. Meter Constant (imp/kwh)
xi. Class index of meter
xii. "Property of WBSEDCL"
xiii. Purchase Order No. & Date
xiv. Guarantee (Guaranteed for a period of 5 ½ years from the date of delivery)
xv. BIS marking
xvi. Place of manufacture
xvii. Bar coded Serial No. of the meter along with manufacturing year & month.
xviii. The reference temperature if different from 27 ^{0}C.
xix. The sign of Double Square for insulating encased meters.

15.0 CONNECTION DIAGRAM AND TERMINAL MARKING: Every meter shall be indelibly marked with a diagram of connection. It is permissible to indicate the connection diagram by an identification figure in accordance with relevant standards. The marking of meter terminals shall appear on this diagram.

16.0 DISPLAY OF MEASURED VALUES :

i. The meter shall have alphanumeric display with at least 7full digit with LCD backlit display, having minimum character height of 8mm. The data shall be stored in nonvolatile memory. The non-volatile memory shall retain data for a period of not less than 10 years under unpowered condition. Battery back-up memory will not be considered as NVM.

ii. It shall be possible to easily identify the single or multiple displayed parameters through symbols / legend on the meter display itself or through display annunciation which shall be self explanatory and symmetric.

iii. In addition to provide Serial Number of the meter on the display plate, the meter serial no. shall also be programmed into meter memory for identification through communication port for CMRI / laptop / meter reading printout.

iv. Visibility of display in poor light conditions is an important criterion. STN or TN or any better type of advanced LCD to be used. Proper legends for the displayed parametersto be provided (Factory programmable). Back lit provided for clear visibility shall be uniform throughout all part of the LCD.

v. The meters shall have auto-display mode for pre-selected parameters. Push-Button mode of display shall display all parameters and it shall have priority over auto mode. The meter shall give clear message on display to indicate that the meter has experienced tampers and the nature of tamper with date and time of first occurrence, last occurrence and last restoration, if the Last tamper status is not restored, then meter will indicate first occurrence, last restoration and last occurrence.

vi. Connection checkand self diagnostic shall give clear message on display. The meter shall have a test output (blinking **LED)** accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. Test output in the form of one LED shall be provided for active energy.

17.0 DISPLAY SEQUENCE: The meter shall display the required parameters in two different modes as follows. Display sequence for both auto and Push button must be maintained, no interchange in sequence or display parameter will be accepted. All the displaysshall have proper legends to identify the same.

17.1 Auto Display Mode:The following parameters shall be displayed in auto cycle mode, in the following sequence.

17.1.1 Cumulative Active Import Energy in kWh
17.1.2 Cumulative Active Export Energy in kWh

17.2 Push Button mode: The following parameters shall be displayedon pressing the push button

17.2.1 LCD Test
17.2.2 Meter Serial Number

17.2.3 Real Date
17.2.4 Real Time
17.2.5 Cumulative Active Energy (kWh) - import
17.2.6 TOD-wise Cumulative Active Energy (kWh) - import
17.2.7 Cumulative Active Energy (kWh) - export
17.2.8 TOD-wise Cumulative Active Energy (kWh) - export
17.2.9 Cumulative ApparentEnergy (kVAh) – import
17.2.10 Cumulative ApparentEnergy (kVAh) – export
17.2.11 History 1 Cumulative Active Energy (kWh) - import
17.2.12 History 1 TOD-wise Cumulative Active Energy (kWh) - import
17.2.13 History 1 Cumulative Active Energy (kWh) - export
17.2.14 History 1 TOD-wise Cumulative Active Energy (kWh) - export
17.2.15 Current Month'sDemand (kW) – import with Date and Time
17.2.16 Current Month's Demand (kW) – export with Date and Time
17.2.17 History 1 Maximum Demand (kW) – import with Date and Time
17.2.18 History 1 Maximum Demand (kW) – export with Date and Time
17.2.19 Instantaneous Voltage
17.2.20 Instantaneous Phase Current – with direction
17.2.21 Instantaneous Neutral Current – with direction
17.2.22 Instantaneous Power Factor – with sign
17.2.23 Instantaneous Active Power (kW) – with sign
17.2.24 Instantaneous Apparent Power (kVA)
17.2.25 Instantaneous Frequency
17.2.26 Cumulative Tamper Count
17.2.27 First Event Occurrence with Date and Time
17.2.28 Last Event Occurrence with Date and Time
17.2.29 Last Event Restoration with Date and Time
17.2.30 Cover Open Information with date and time
17.2.31 High resolution display for kWh (both Import & Export) - minimum 2+4
17.2.32 Self Diagnosis

17.3 Power OFF Mode Display:

The meter shall have the provision of providing the display of billing parameters (Auto Display) in absence of main supply. Press of shall activate the display to facilitate hands free meter reading with auto-off provision. Meter may be Powered on after 2 years, and, battery backup power must be stable on that condition. Battery for RTC shall not be less than 350mAh (±10%) It shall be possible to read the meter using CMRI / PC during power-off condition using this facility. Battery for downloading and display power up purpose shall not be less than 650 mAh (±10%) or it should be chargeable.

17.4 Display for Auto and manual mode must be listed by two headers:

17.4.1 "Auto Display Mode"

17.4.2 "Push Button Mode" (Parameters shall be pasted in front of the PP Box)

17.5 Display: Other requirements:

17.5.1 Each parameter shall be on meter display for 10 secand the time gap between two auto display cycles shall be 20 sec.

17.5.2 The register shall be able to record and display starting from zero, for a minimum of 2500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register shall not roll over in between this duration.

17.5.3 High resolution display can be given in separate mode and its registers required in display min 2+4 digits (for kWh) after decimal in case of Energy.

17.6 Besides other details as to be provided in "Auto" & "Push Button" display modes, and, their derivatives, the following parameters shall have to be made available through BCS in downloaded data.

17.6.1 TOD wise Cumulative kWh (Import) – Month-wise History for last 12 months

17.6.2 TOD wise Cumulative kWh (Export) - Month-wise History for last 12 months

17.6.3 TOD wise Maximum Demand in kW(Import) with date & time – Month-wise History for last 12 months

17.6.4 TOD wise Maximum Demand in kW(Export) with date & time – Month-wise History for last 12 months

17.6.5 TOD Wise Cumulative kWh(Import) (up-to-date)

17.6.6 TOD Wise Cumulative kWh(Export) (up-to-date)

18.0 MAXIMUM DEMAND REGISTRATION AND RESET:

Meter shall continuously monitor and calculate the average maximum demand for each demandinterval time of 30 minutes and maximum of these in a calendar month (both for import & export) shall be stored alongwith date and time when it occurred. The maximum demand shall automatically reset at 24:00hours of the last date or 00:00 hours of the first date of each calendar month and the correspondingvalue along with date/time stamp shall be transferred to Billing (History) registers.

The integration period shall be set as 30 minutes, on real-time basis.

19.0 ANTI TAMPER FEATURES :

The meter shall be capable of recording energy accurately at Import as well as Export mode. If current flows in forward direction, the meter shall register energy in Import counter and if phase current flows in reverse direction, it shall register energy in Export counter and no tamper event shall be logged.

Visual indication for export mode operation, single wire, neutral disturbance, magnetic tamper, cover open event shall have to be provided in meter LCD display.

The meter shall have the following anti-tamper features and register energy accurately under the following conditions taking the values of phase current and neutral current into account and calculating energy on whichever of the two is higher:

19.01 Drawing of current through local earth

The meter shall register accurate energy even if the load is not terminated back to the meter and instead current is drawn partially of fully through a local earth irrespective of the phase and neutral connections to the meter. "Earth load indication" shall appear in display with logging of tamper, if difference between phase current and neutral current is found to be more than 6%. Test will be done through actual load. In this case allowable limit will be within 2% w.r.to Master Meter.

19.02 Drawing of load by disconnecting Neutral of meter & outgoing Earth:

When neutral is disconnected from both load side and supply side, the meter shall record energy as per rated parameters (Vref, UPF & actual current). Accuracy must be maintained within $\pm$ 4%.

19.03 Meter shall record energy with maximum error of ± 4% even in absence of neutral / Phase wire not connected at incoming & outgoing, i.e. single wire operation. In such condition Meter should start recording energy at 1.0 Amps. However, meters, which are immune or maintain better accuracy,

will be preferred. Both elements should record energy under single wire mode if same phase is given in both elements and total load is driven through earth.

19.04 Meter shall record energy with maximum error of (+) 6% to (-) 4% on Injection of DC (+)ve& DC (-) ve in neutral having magnitude up to 400 V & injection of chopped AC in neutral& injection of pulsating D.C. in meter neutral. Tests in this respect will be conducted by usinga device available with WBSEDCL for chopped AC injection (60V to 300V) & steady DC injection & Pulsating DC injection set. Steady DC voltage will be rectified from a three phase powersupply.

19.05 Meters shall offer compliance to requirements of CBIP-325 and its amendments for tampering using external magnets. The meter should be immune to tamper using external magnets. The meters shall be immune to 0.2T of A.C. magnetic fields and 0.2 T of D.C. magnetic fields, beyond which it shall record as tamper if not immune. **Energy registration shall be in Import mode only with Imax.**

19.06 The meter shall be either immune to Electro Static Discharge or sparks of 35 KVp(Approx) generated from automobile ignition coil and high frequency Jammer. Tests in this respect willbe conducted by using commonly available devices and during spark discharge test, sparkwill be applied directly at all vulnerable points of the meter for a period of 10 to 20 minutesand meter shall have to record within ±4% error w.r.to Master Meter under this condition. After application of spark discharge meter shall have to record correctly within the specified limits of errors. Beyond 35KVp, if the meter is not immune, it shall record tamper.

19.07 The registration shall not be affected more than + 4% if high frequency (55Hz to 100Hz) or low frequency (45Hz to 30 Hz) AC signal w.r.t. earth is applied to the meter neutral. Meters which are immune or will maintain better accuracy, will bepreferred.

19.08 *The meter shall be capable of recording occurrence and restoration with date and time in respect to the following tamper events:*

19.08.1 Power failure
19.08.2 *Single Wire / Neutral Missing*
19.08.3 *Neutral Disturbances*
19.08.4 *Magnetic Disturbances*
19.08.5 *Earth Tamper*

19.09 Threshold Values of all above occurrence and restoration are attached in Annexure II.Snapshot values of Phase Voltage, Phase Current, Neutral Current, Power Factor, Active Energy value during occurrence & restoration to be provided in all the above mentioned tamper conditions in BCS with date and time. (In Event logging Snapshots shall be considered when the actual phenomenon occurred).

19.10 All authenticated commands shall be Base Computer Software(BCS) controlled. All transactions with meter shall be date and time logged, in the downloaded data (Last 12 month's transactions).

19.11 A minimum of 300 events (one event means either occurrence or restoration) of all types of tamper with date & time stamping along with snapshots of V, I, PF and kWh shall be available in meter memory and logging will be on FIFO basis.

19.12 Meter shall have a continuous and clear indication in its display if top cover is removed / opened and even re-fixed (non rollover) and cover open must be logged in BCS without any restoration.

20.0 LOAD SURVEY: The meter shall be capable of recording load survey for the following parameters for a period of minimum 60 days - ensuring availability of all parameters listed below with 30 minutes integration period and the following load survey data must be available in BCS in both graphical as well as tabular format.

20.01 Energy in kWh (Import & Export mode shall be shown clearly)

20.02 Energy in kVAh (Import & Export mode shall be shown clearly)
20.03 Demand in kVA and kW ((Import & Export mode shall be shown clearly)
20.04 Phase Current
20.05 Neutral Current
20.06 Voltage
20.07 Power Factor

The Load Survey data for above parameters shall be viewed at BCS in daily, weekly and monthly formats. Data export facility in excel file shall be available at BCS end for generation of reports.

21.0 The NVM shall not require any additional battery backup to retain the data in case of power failure, for upto 10 years and the data storage shall be independent of batterybackup unit.The life of the RTC battery in circuit condition shall be minimum 10 years in case ofpower failure.It shall be possible to transfer this data to base computer software through MRI/Laptop or RMR. The data so obtained shall be displayed in both graphical &numeric form in the BCS. The BCS with all details is to be provided by the supplier at no extra cost.

22.0 TIME OF DAY FACILITIES : The meter shall have facilities to record Active, Apparent Energies and MD in at least 8 zones. The time zones shall be user programmable through authenticated MRI/Laptop/RMR command. Necessary software for the same is to be provided by the bidder.At present TOD timings will be programmable as follows:

21.1TOD 1: *06:00 Hrs to 17:00 Hrs.*
21.2TOD 2: *17:00 Hrs to 23:00 Hrs.*
21.3TOD 3: *23:00 Hrs to 06:00 Hrs.*

23.0 METER READING DURING POWER OFF: It shall be possible to read the meter-display visually and with CMRI/Lap top in absence of input voltages with the help of internal battery backup. In case of external battery the arrangements shall be such that hands free operation is possible. In case of external battery 10 years guarantee must be given for external battery/power pack. Separate battery shall be used for this purpose(Not RTC or processor battery). In case of Lithium battery rating shall be more than 500mAh.

24.0 SELF DIAGNOSTIC FEATURES: The meter shall be capable of performing complete self-diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data memory location all the time. If possible, the details of malfunctioning shall be recorded in the meter memory. The bidder shall furnish the details of self-diagnostic capability feature, viz Memory status (NVM) and Battery status, RTC Status etc. and it shall be in displayas well as in BCS.

25.0 TECHNICAL SUPPORT, MANUALS &TRAINING: Extensive technical support, detailed technical literature (shall supply with each meter at the time of packing) & training is to be provided by the manufacturer. Supply of External Battery Packs if required to be provided by the manufacturer and shall be clearly offered in their bids.

26.0 INFLUENCE QUANTITIES : The meter shall work satisfactory with guaranteed accuracy as per limit provided in IS: 13779(clause No.9.2.1 and 11.2) .

27.0 COMMUNICATION CAPABILITY:

27.01The meter shall have a galvanic isolated Optical Port as per IEC 1107/ANSI/PACT so that it can be easily connected to a handheld Common Meter Reading Instrument

(CMRI)/Laptop/PC for data transfer. The optical port shall be provided with proper sealing arrangement so that its cover can't be opened without breaking its seal.

27.02 The stored data in the meter shall be available through CMRI even when the display of the meter is not available.

28.0 BASE COMPUTER SYSTEM & SOFTWARE REQUIREMENTS:

28.01 The Common Meter Reading Instrument (CMRI) shall be loaded with user-friendly software (MS-DOS 5.0 or higher version compatible) for reading and/or downloading meter data.

28.02 Windows (Windows 7.0 and higher version) based Base Computer Software (BCS) shall be provided for receiving data from CMRI and downloading instructions from BCS to CMRI.

28.03 The data stored in the meters memory including defrauded energy shall be available on the BCS.

28.04 Six no. of BCS shall have to be provided for downloading data andauthenticated command from CMRI/ Laptop.

28.05 The BCS shall have facility to convert meter reading data into user definable ASCII file format so that it can be integrated with the billing system or any other third party software. The user shall have the flexibility to select the parameters to be converted into ASCII file.

28.06 All the data available in the meter including energy, MD etc. with date and time stamp, new TOD time zones and historical data shall be available in BCS after down loading.

28.07 The bidder shall supply the necessary CMRI software during sample meter testing.

28.08 The bidder has to supply the meter reading protocol and API free of cost. The bidder shall indicate the relevant standard to which the protocol is compliant.

28.09 Transfer of data from the meter to CMRI & then to the BCS shall be easily executed.

28.10 Any change or up gradation of CMRI software or BCS in future, required for any reason, has to be done by the supplier at his own cost.

28.11 The same software shall be capable of preparing CMRI to read the meter information or to reconfigure the meter for change of TOD timings and / or time setting of the meter etc. The exhaustive online help shall be available with the software so that user can use all the features of the software by just reading the help contents.

28.12 In BCS twelve months' data backup for the following parameters shall be available:

a) Total & TOD-wise kWh (import & export)
b) Total & TOD-wise kVAh (import & export)
c) Total & TOD-wise kW (import & export)
d) Total & TOD-wise kVA (import & export)
e) Average Power Factor (import& export)
f) Average Load Factor
g) Power ON Hours
h) Cumulative Active Demand (kW) since manufacture (import & export)

29.0 GUARANTEED TECHNICAL PARTICULARS: The bidder shall furnish all the necessary information as desired in the Schedule of Guaranteed Technical Particulars and data, appended with this Specification.

30.0 INSPECTION &TESTS :

30.01 The meters and pilfer proof meter boxes manufactured as per requisite technical specification along with accepted changes recorded in minutes of pre-bid meeting(s), shall be subject to tests as per relevant Indian Standards.

30.02 No change/ deviation/ modification in the technical specification of the meters offered for inspection & testing in respect to the approved sample meters shall be entertained.

30.03 BCS and CMRI software version shall be the same as accepted during approval of the related sample meter. In case any change in BCS and/or CMRI software is felt necessary by the supplier, the Chief Engineer(DTD) shall have to be approached in writing for his approval elaborately clarifying the necessity prior to commencement of inspection. The deviation(s) shall be accepted if and only if the Chief Engineer(DTD) approves the proposed deviation(s).

30.04 **Stage Inspection**: Stage Inspection, if required may be conducted at manufacturers' works. For this, the supplier must give prior intimation at least 15(fifteen) days before final calibration (with RTC reset). The supplier shall extend all facilities for such inspection and testing for which no extra cost shall be charged and the physical inspection report, containing observation against components, raw materials, display modules, push button, nameplate etc. shall have to be signed jointly. Otherwise offer for final inspection will not be accepted.

30.05 **Routine Test:** Routine Tests as per relevant Indian Standards and requisite technical specification shall be conducted for each & every meter and pilfer proof meter box after its production.

30.06 **Lot Acceptance Test:**

30.06.1 The supplier shall give prior intimation about the readiness of the meters and the pilfer proof meter boxes at the works for inspection and testing at least 15 (fifteen) days before their proposed inspection schedule. The supplier shall extend all facilities for such inspection and testing for which no extra cost shall be charged and the inspection report shall have to be signed jointly. Otherwise the offered lot(s) shall be treated as cancelled.

30.06.2 While offering inspection and testing, one hard copy & one soft copy of the routine test reports indicating test results of each meter of the offered lot containing its sequential meter serial no. and the serial no. of the two no. of body seals shall be submitted to the Office of the Chief Engineer (DTD), WBSEDCL, Abhikshan, Sector- V, Salt Lake City, Kolkata - 700091 with copies to the Office of the Chief Engineer (P&C), WBSEDCL. Otherwise inspection offer will not be considered.

30.06.3 However, WBSEDCL reserves the right to depute their Engineers for carrying out inspection and testing on the offered lot as per relevant Indian Standards and requisite technical specification, already notified and also reserves the right to reject either raw materials or finished products found to be not conforming to the requisite technical specifications and/or relevant Indian Standards.

30.06.3.1 The Engineers of WBSEDCL shall witness the various quality control measures adopted in production line and satisfy themselves about the same. They shall also inspect the protocol for maintaining the accuracy of the meter testing equipment at the testing laboratory of the manufacturer with reference to the standard. The instruments and equipment required for inspection & testing shall have valid calibration certificates as specified in relevant clause of this order.

30.06.3.2 Physical examination of the meters including display as per OBIS code on minimum 5% of offered quantity will be carried out. If during physical inspection anomaly is found in more than 2% of the offered quantity, no further test will be carried out and offered quantity will be rejected.

30.06.3.3 After satisfactory result in physical examination, lot acceptance tests shall be carried out by the representatives of WBSEDCL at the works of the manufacturer as stated hereunder:

a) The maximum no. of meters in each lot: 20000

b) No. of meters to be selected at random from the lot : as per IS

(If Offered Quantity <= 300, no. of samples shall be 8;
If Offered Quantity > 301 and <= 500, no. of samples shall be 13;
If Offered Quantity >500 and <= 1000, no. of samples shall be 20;
If Offered Quantity > 1000, no. of samples shall be 32;)

30.06.3.4 After selection of sample meters, the following tests shall be carried out on all the meters selected at random.

(i) Test of protection for withstanding 433V between Phase & Neutral for 1(one) hour.
(ii) Test of endurance upto 150% I max for 2(two) hours.
(iii) ac High Voltage test : Test voltage 2kV shall be applied for 1 min (Clause 12.7.6.3 IS 13779:1999)
(iv) Insulation resistance test (Megger test): (Clause 12.7.6.4 IS 13779:1999)
(v) Test of Starting Current: At 0.4% of basic current, reference voltage & UPF (Clause 11.5 Table-19 IS 13779:1999)
(vi) Test of No Load condition (Creep test) : At 70% and 120% of Vref with no current flowing in the current circuit the test output of the meter shall not produce more than one output pulse. The minimum test period shall be 20 times the actual period of starting current test. The maximum test period shall be limited to 200 minutes. (Clause 12.13. IS 13779:1999; Clause 5.6.4 CBIP 304)

30.06.3.5 In the above tests, if the number of defective meter is nil, the lot shall be considered conforming to the tests.

30.06.3.6 If the number of defective meters is not nil, but, within the specified limit, further sampling as per IS 13779:1999 (ANNEX H Clause 12.2.2.1 RECOMMENDED SAMPLING PLAN) shall be made.

30.06.3.7 If the number of defective meters from two such samples remains within the IS 13779:1999 specified limit only then the lot shall be considered as conforming to the test.

30.06.3.8 Further testing for 8 number of meters, selected from initially selected sample meters will be carried out as follows:

(i) Test of Limits of Error on all the 8 no. of sample meters for active energy (as per IS 13779:1999)

1% I basic	1.0 pf.
2% I basic	1.0 pf.
5% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead
10% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead
50% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead
100% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead
120% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead
200% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead
600% I basic	1.0 pf., 0.5 pf. Lag & 0.8 lead

(ii) Voltage Variation Test
(iii) Frequency Variation Test
(iv) Test of the Meter Constant: At I max and UPF (as per IS 13779:1999)
(v) Meter Dial test: as per IS 13779:1999 & PO
(vi) Test of Power Consumption in voltage & current circuit:

a. On voltage circuit : 1.5w/phase, 10VA/phase

b. On current circuit :1.0VA/phase

30.06.3.9 Further testing of 3 no. of sample meters will be carried out as follows:

(i) Repeatability of Error Test at 5% I basic &UPF ; 100% I basic & UPF ; 100% I basic & 0.5 Lag, all at reference voltage: Six error tests to be successively carried out in the above load condition at time interval of at least 5 min. Variation between max & min % of errors shall be within 0.05.

(ii) **If any of the meters fails on any of the above tests, the lot will be rejected.**

30.06.3.10 Further testing for 1 number of sample meter will be carried out as follows:

(i) Tamper & Fraud protection (Anti-tamper feature) as per relevant clause of the specification.
(ii) Magnetic induction of external origin (AC & DC) (CBIP 304)
(iii) Physical verification of internal components.

30.06.3.10.1 If **the meter fails on any of the above tests, the lot will be rejected.**

30.06.3.10.2 Few mention-worthy relevant points regarding tamper testing :

30.06.3.10.2.1 AC Chopped signal may be generated through Regulator or Dimmer

30.06.3.10.2.2 In Discharge Test, meter performance will be checked applying 35 KV spark

30.06.3.10.2.3 Provision must be there for tamper logging in BCS in case the spark exceeds 35 KV

30.06.3.10.2.4 In BCS , average PF & LF, kWh, kVAh, MD in kW & kVA, TOD-wise kWh and kVAh must be made available for last twelve (12) months

30.06.3.10.2.5 In Magnetic Tamper Test, magnetic influence shall be checked at 10mT AC, 0.27T DC, 0.2T AC and 0.5T Permanent Magnet. Facility to measure the capacity of these magnetic fields must be available at manufacturers' premises and must be calibrated from any NABL accredited laboratory.

30.06.3.11 The following tests must be conducted on any one sample meter:

i) DLMS compliance
ii) RTC Checking
iii) MD Resetting in different modes
iv) TOD setting
v) BCS Checking
vi) Display parameters including High Resolution Display
vii) Downloading of data in Power Off mode
viii) Firmware version checking

30.06.3.12 Shunt test : Applying 100 Amps continuous load for two hours after removing it from the meter for verification and conformation for quality of shunt & its E-beam welding.

30.06.3.13 **Dry Heat Test**:

30.06.3.13.1 Facilities or arrangement for conducting ageing test shall be available with the manufacturer.

30.06.3.13.2 Dry heat test as per clause 12.6.1 of IS: 13779:1999. – At least one sample selected from any lot of the meters offered for first inspection will be sealed by the inspecting authority

of WBSEDCL and handed over to the supplier for testing at NABL accredited laboratory. In the test report, meter serial no. & meter body seal nos. are to be mentioned.

30.06.3.13.3 Test result must be submitted within 30 days after selecting the meter at the manufacturer's works. If not submitted within the stipulated time frame, no further offer for inspection will be accepted.

30.06.3.13.4 If the meter fails at dry heat tests, the particularly delivered lot will not be accepted and the delivered meters are to be taken back by the supplier at their own cost from different site offices within 30 days from the date of receipt of intimation in this regard. Only after withdrawal of the delivered meters, further inspection shall be conducted against subsequent offered lot of meters.

30.06.3.13.5 If the meter, selected during inspection at first lot of meters, fails in dry heat test, the same test is to be conducted for the consecutive offered lots of meters following the above procedure, unless satisfactory performance on above test is observed.

30.06.4 **Type Testing of Meter:** The offered meters shall be type tested at any NABL accredited laboratory in accordance with IS 13779 and CBIP Report 325 with their latest amendments. The type test report shall not be more than 3 (three) years old. A copy of the Type Test results shall be enclosed with the offer. If there is any modification in the design / parameters of the specifications or use of constituent materials in the offered meters submitted with the offer, from the meter which was submitted type tested, which may affect the characteristics as well as parameters of the meter, revised type test certificates as per the design, parameters and constituent material used in the offered meter, shall have to be submitted failing which the offer may be liable to be rejected.Type Test Certificate from any NABL accredited Lab shall only be considered.Type test certificate shall contain the following information clearly:

30.06.4.1 Type of display or LCD
30.06.4.2 Class of accuracy
30.06.4.3 Meter constant
30.06.4.4 Type of meter

30.06.5 **Acceptance Tests:** The acceptance tests as stipulated in CBIP / IS (with latest amendments) shall be carried out by the supplier in presence of purchaser's representative.In case of failure of Meters as specified in Recommended Sampling Plan of IS-13779, the entire lot will be treated as rejected. Also the following additional tests are to be carried out on one meter randomly selected from each lot offered for inspection / acceptance testing. In case of failure of any single meter the entire lot will be rejected.

30.06.5.1 Magnetic induction of external origin (AC & DC)
30.06.5.2 Tamper & Fraud protection, as per relevant Clause of this specification.
30.06.5.3 Test of endurance upto 150% of I_{max}, for two hours, followed by verification of limits of error.
30.06.5.4 Verification of internal components.
30.06.5.5 Dry Heat Test under Test of Climatic Influences in IS 13779: 1999 of one meter from the offered lot is to be arranged by the supplier at any NABL accredited laboratory, at his cost.

30.06.6 **Routine Tests :**Each and every meter of the offered lot shall undergo the routine tests as well as functional tests as per IS: 13779/1999, CBIP Report 325 and after sealing the meters, the manufacturers will have to submit the routine test report of all the meters as well as a statement showing seal Sl. Nos. against each meter Sl.No. of offered lot in soft copy (MS WORD or EXCEL format), to the Chief Engineer(Procurement and Contract) and the Chief Engineer(DTD), along with offer letter for acceptance test.

30.07 **TEST FACILITIES:**The tests for equipment / instrument shall be carried out as per relevant Standards and test certificates shall be furnished for scrutiny. The Bidder shall indicate the details of the equipment available with him for carrying out the various tests as per relevant Standards. The bidder shall indicate the sources of all equipments / instruments.

30.08 The standard meters used for conducting tests shall be calibrated periodically at any NABL Accredited Test Laboratories and test certificates shall be available at Works for verification by purchasers' representative.

30.09 The manufacturer shall have at least the following testing facilities to ensure accurate calibration:-

30.09.1 AC high voltage test
30.09.2 Insulation test
30.09.3 Test of no load condition
30.09.4 Test of Starting condition
30.09.5 Test on Limits of error (Automatic Testing facility with ICT)
30.09.6 Power loss in voltage and current circuit
30.09.7 Test of Repeatability of error
30.09.8 Test of meter constant
30.09.9 Test of magnetic influence (As per CBIP 325 & Permanent Magnet)

30.10 INSPECTION**:**

30.10.1 The purchaser may carry out the inspection at any stage of manufacture. The manufacturer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing the equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. All acceptance tests and inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the Bidder and purchaser at the time of purchase. The Bidder shall provide all reasonable facilities without charge to the inspector, to satisfy him that the equipment is being furnished in accordance with this specification.

30.10.2 The supplier shall keep the purchaser informed in advance, about the manufacturing programme for each lot so that arrangement can be made for inspection. The purchaser reserves the right to insist for witnessing the acceptance / routine testing of the bought out items. The supplier shall give 15 days for local supply / 30 days in case of foreign supply advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

30.10.3 The purchaser reserves the right to get type test any meter, for meter casing etc. from any of the offered lots, reserve at any destination stores.

31.0 SUBMISSION OF SAMPLE METER:

Bidder has to submitsample meters, as per date mentioned in NIT, to the office of the CE, DTD, WBSEDCL for sampletesting as part of technical evaluation of the NIT.

32.0 QUALITY ASSURANCE PLAN: The design life of the meter shall be minimum 20 years and to prove the design life the firmshall have at least the following quality Assurance Plan.

31.1The factory shall be completely dust proof.
31.2The test rooms shall be temperature and humidity controlled as per relevant standards.
31.3The test and calibrating equipments shall be automatic and all test equipment shall have their valid calibration certificates.
31.4Meter will be tested (in case of lot test) in fully automatic test bench with ICT. No. human intervention will be allowed during test.
31.5Power supplies used in test equipment shall be distortion free with sinusoidal wave forms and maintaining constant voltage, current and frequency as per the relevant standards.

33.0 LAB FACILITY: The laboratory of manufacturer must be well equipped for testing of the meters. They must have computerized standard power source and standard equipment calibrated not later than a year (or as per standard practice).

34.0 GUARANTEE:

33.1The Meters and Pilfer Proof Meter Boxes shall be guaranteed arising out of faulty design,materials, bad workmanship for a period of **5½ years** from the date of supply.
33.2Life of battery used for the meter shall be guaranteed for 10 years.

35.0 COMPONENT SPECIFICATIONS: The meters shall be designed and manufactured using SMT (Surface Mount Technology) components, except for power supply components, LED / LCD etc., which are PTH type. All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed makes so as to ensure higher reliability, longer life and sustained accuracy. The Components used for manufacture of meter shall be of high quality.

Sl. no.	**Component Function / Feature**	**Requirement**	**Make / origin**
1	Current Element	E-beam /spot welded CT shall beprovided in the phase element and in theneutral with proper isolation.	Any make or origin conforming to IS-2705
2	Measurement /computing chips	The Measurement / computing chips usedin the meter shall be with the Surfacemount type along with the ASICs.	USA:Analog Devices,AMS, Cyrus Logic, Atmel, SAMES, Texas Instruments,Teridian;Japan: NEC,Freescale,Renesas;Holland: Phillps
3	Memory chips	The memory computing chips shall notbe affected by the external parameterslike sparking, high voltage spikes orelectrostatic discharges	USA: National SemiConductor, Atmel,SAMES, TexasInstruments, Teridian,ST, Microchip; Japan: Hitachi,OKI,Freescale, Renesas; Holland / Korea:Phillps
4	Display modules	The display modules shall be well protectedfrom the external UV radiations. The displayshall be clearly visible over an angle of atleast a cone of 70o.The construction of themodules shall be such that the displayedquantity shall not disturbed with the life ofdisplay. The display shall be TN typeindustrial grade with extended temperature range	Singapore: Bonafied Technologies; Korea: Advantek; Japan : Hitachi, SONY,Hijing,Truly Semiconductor; Chaina: Tianma
5	Communication	Communication modules shall be	USA: NationalSemiconductors, HP,ST,

	modules	compatible for the RS 232 ports	Texas Instruments,Agilent, Avago;USA / Korea: Fairchild;Holland/ Korea: Philips;Japan: Ligitek, Hitachi, Germany: Siemens,Tiwan: Everlight,
6	Optical port	Optical port shall be used to transfer themeter data to meter reading instrument. Themechanical construction of the port shall besuch to facilitate the data transfer easily.	USA: NationalSemiconductors, TexasInstruments, HP,Agilent, Avago,Germany/USA :Osram;Japan: Hitachi, ,21; Germany:Siemens;Holland / Korea:Philips; Tiwan:Everlight,
7	Power Supply	The power supply shall be with the capabilities as per the relevant standards. Thepower supply unit of the meter shall not beaffected in case the maximum voltage of thesystem appears to the terminals due to faults ordue to wrong connections.	As specified.
8	Electronic components	The active & passive components shall be ofthe surface mount type & are to be handled &soldered by the state of art assemblyprocesses.	USA: NationalSemiconductors,Atmel, Phillips, TexasInstruments, ST,Onsemi; Japan: Hitachi, Oki,Toshiba. Freescale; Korea: Samsung.
9	Mechanical parts	The internal electrical components shall be ofelectrolytic copper &shall be protected fromcorrosion, rust etc. The other mechanical components shall beprotected from rust, corrosion etc. by suitableplating / painting methods.	N.A.
10	Battery	Lithium-ion with guaranteed life of 10 years	Renata, Panasonic,Varta, , Sanyo, National,Tadiran, Sony,Duracell,Tekcell,Mitsubishi, EVE, SAFT , XENO
11	RTC / Micro controller	The accuracy of RTC shall be as per relevantIEC / IS standards	USA: Dallas, Atmel,Motorola, NEC,TeridianRenesas, TexasInstruments, ST, Microchips,Epson; Holland / Korea:Philips;Japan: NEC, OKI,Hitachi, Mitsubishi,Freescale,

ANNEXURE-I		
GUARANTEED TECHNICAL PARTICULARS OF AC SINGLE PHASE TWO WIRE, L.T. STATIC, WHOLE CURRENT (5-30)A IMPORT EXPORT ENERGY METER WITH LCD DISPLAY		
Sl. No.	**Item Description**	**Manufacturer's Particulars**
1.	Name of manufacturer	
2.	Type (Model No.), name & number	
3.	Standard Applicable	IS: 13779/1999, IS:12346/1988,IS: 14434/1998, CEA regulation no. 502/70/CEA/DT&D dt.17.03.06 and CBIP technical report no.325 with its latest amendment as on date.
4.	Rating	
(a)	Accuracy Class	Class 1.0
(b)	Rated Voltage	240V Ph to Neutral (+70% to 120%)
(c)	Rated Current	I_b: 5A, I_{max}: 30A
(d)	Rated Frequency	50 Hz ± 5%
(e)	Power Factor	0 lag to unity to 0 lead
(f)	Minimum Saturation Current	Bidders to specify
(g)	Meter Constant (Imp / KWH)	
5.	Maximum Continuous Current (A)	30A
6.	Continuous Current Rating of Terminals for two hours	45A
7.	Running under No Load &with 70% to 120% of Rated Voltage	No creeping
8.	Short time Over Current (for 10 mili second)	30 I_{max} for one half cycle at rated frequency
9.	Starting Current at which meter shall run & continue to run	0.4% of I_b at rated voltage and unity power factor
10.	Power loss at rated frequency & reference temperature	
(a)	Current circuit at rated current	Less than 4 VA per phase
(b)	Voltage circuit at rated current	Less than 1.5W / 8 VA per phase
11.	Maximum Demand	
(a)	Parameter	kW, kVA
(b)	Integration Period	30 min
(c)	Resetting Options	Auto Resetting:
		Default Schedule: 24:00 Hrs. of the last day or 00:00 Hrs. of the first day of each calendar month
		Storing of data : MD value along with date/time stamp shall be preserved in History
12.	Type of material used	
(a)	Base	High impact strength, non-hygroscopic, fire retardant, fire resistant, UV stabilised poly carbonate (Lexan 503R or equivalent). Meter base with LEXAN 500R/143R may be accepted subject to verification.
(b)	Meter cover	High impact strength, non-hygroscopic, fire retardant, fire resistant, UV stabilized transparent poly carbonate (Lexan 943A or equivalent)
(c)	Terminal Block	Material High impact strength not hygroscopic, fire retardant, fire resistant, UV stabilized poly carbonate (Lexan 503R or equivalent) Barrier of adequate size shall be provided between phase and neutral. Terminal block with LEXAN 500R/143R may be accepted subject to verification.

(d)	Terminal cover	High Impact strength, non-hygroscopic, fire retardant, fire resistant, glass reinforced poly carbonate (Transparent)& non detachable with hinging arrangement (Lexan 943A or equivalent). Terminal cover with LEXAN 143 may be accepted subject to verification.
(e)	Screw	
	(i) Material	Tin/Nickel-plated Brass
	(ii) Size	As per relevant IS Standards
13.	Internal diameter of Terminal Hole	Min. 5.5 mm
14.	Centre to Centre clearances between adjacent terminals	13 mm
15.	Transducers	
(a)	Input	CT or Shunt provided in phase element and in the neutral. Voltage: Potential divider (PT less)
(b)	Output	LCD
(c)	CT - no. of turns	Bidders to specify
16.	Type of Register	LCD suitable for operation up to 60°C
(a)	No. of Digits	7
(b)	Size of Numerals	8 X 5 mm (minimum)
17.	Display	
(a)	Scroll mode & Auto display mode	Up or Down Scroll mode & Auto display mode
(b)	Type of push button	Spring loaded push button to be provided on top cover of meter to read parameters.
18.	Reading on power off condition	Meter shall be able to display reading during power outage with backup power through the push button provided on the meter. All data down loading facility shall be provided in power off condition.
19.	Battery of Real time clock	
(a)		It shall be Lithium-ion battery having at least 10 years of life
(b)		The drift in time shall not exceed +/- 3 minutes per year
20.	Fixing/sealing arrangement	
(a)	Fixing of meter	3 fixing holes (one at top & two at bottom under sealable terminal cover). The top fixing screw shall not be accessible after meter is fixed to Pilfer Proof Meter Box base.
(b)	Sealing of meter cover to Base	At least, two fixing screws for fixing meter cover with the meter base shall be provided. Each Screw shall have two holes one for fitting/fixing of manufacturer's seal and the other for utility seal. The arrangement shall be in such manner that any access to the working part of the meter body will not be possible without breaking/ tampering / removing the said seals. Suitable arrangement shall be made for fitting/fixing of utility seal at two sides of meter terminal cover in such a manner that any access to the terminal cannot be possible without removing the seals. There shall also be provision for sealing at the optical port. The meter cover shall be permanently fixed to the base by ultrasonic welding or by any other technology which is either equally or more efficacious so that cover cannot be opened without breaking, i.e. the meter shall be break to open type. Meter shall have an indication in its display if top cover is removed.
21.	Type of hinged undetectable terminal cover	Terminal cover shall be hinged.
22.	Performance of meter in tamper conditions	
(a)	Input and output Terminals interchanged	Shall work within specified accuracy

(b)	Phase current reverse	Shall work within specified accuracy
(c)	Indication of above tamper condition	LCD / LED indication.
23.	Suitability of meter to sustain over voltage i.e. phase to phase voltage injected between phase & neutral	Shall sustain
24.	Electromagnetic compatibility (EMI / EMC severity level)	As per IS 13779: 1999
25.	(i) Effect on accuracy of external electromagnetic interference of electrical discharge, external Magnetic field	Shall work within accuracy as per latest IS& CBIP report -325 with latest amendment.
	(ii) Neutral Disturbance, Magnetic and other tamper events logging in memory	Meter shall log last 300 events with date and time
26.	Effect on accuracy under tamper conditions / influence conditions	Shall work within accuracy specified in IS: 13779 / 1999, and CBIP tech. Report 325. Error beyond +/- 4 % will not be acceptable for conditions not specified in IS: 13779 / 1999 & CBIP tech. Report 325.
27.	Drift in accuracy of measurement with time	No drift in accuracy in measurement with time
28.	Name plate details	It shall cover all the details as prescribed in relevant Clause of tech spec.
29.	Approximate weight of meter	Bidders to specify
30.	Type of mounting	Projection type
31.	Calibration	Meter shall be software calibrated at factory & there shall not be any mechanical form of calibration, such as, mechanical preset / trim port / potentiometer etc. so that any adjustment in calibration is not possible after freezing the meter constant.
32.	Manufacturing activity	
	(i) Mounting of components on PCB shall be SMT type	SMT type and ASIC technology
	(ii) Compliance to assurance	To be complied
33	Guarantee period of meter	5-1/2 years from the date of supply. Guarantee period shall be printed on the nameplate
34	Load Survey	
(a)	Parameters	Energy in kWh (Import & Export mode) Energy in kVAh (Import & Export mode) Demand in kVA (Import & Export mode) Demand in kW (Import & Export mode) Phase Current Neutral Current Voltage Power Factor
(b)	Integration Period	30 min
(c)	Data Storage Duration	For atleast last 60 days
35.	Display Parameters	
(a)	Auto Display Mode	As per Enclosed Annexure – I (a)
(b)	Push Button Mode	As per Enclosed Annexure – I (b)
(c)	Power Off Mode	As per Enclosed Annexure – I (c)
36.	TOD Facility	
	No. of Time Zones	Programmable up to 8

	Default settings	3 Time Zones
		TOD 1: 06:00 Hrs to 17:00 Hrs.
		TOD 2: 17:00 Hrs to 23:00 Hrs.
		TOD 3: 23:00 Hrs to 06:00 Hrs.
37.	Tamper Event Logging Threshold	As per Annexure - II
38.	Other parameters / features not covered in the above GTP	Conform to specification of IS 13779: 1999 & CBIP technical report No.325 (with its latest amendment).

Parameters to be displayed in **"Auto"** display mode**Annexure – I (a)**

The following parameters shall be displayed in auto cycle mode, in the following sequence.

i. Cumulative Active Import Energy in kWh
ii. Cumulative Active Export Energy in kWh

Parameters to be displayed in **"Push Button"**display mode**Annexure – I (b)**

The following parameters shall be displayed on pressing the push button as per the following as per following sequence:

i. LCD Test
ii. Meter Serial Number
iii. Real Date
iv. Real Time
v. Cumulative Active Energy (kWh) - import
vi. TOD-wise Cumulative Active Energy (kWh) - import
vii. Cumulative Active Energy (kWh) - export
viii. TOD-wise Cumulative Active Energy (kWh) - export
ix. Cumulative Apparent Energy (kVAh) – import
x. Cumulative Apparent Energy (kVAh) – export
xi. History 1 Cumulative Active Energy (kWh) - import
xii. History 1 TOD-wise Cumulative Active Energy (kWh) - import
xiii. History 1 Cumulative Active Energy (kWh) - export
xiv. History 1 TOD-wise Cumulative Active Energy (kWh) - export
xv. Current Month's Demand (kW) – import with Date and Time
xvi. Current Month's Demand (kW) – export with Date and Time
xvii. History 1 Maximum Demand (kW) – import with Date and Time
xviii. History 1 Maximum Demand (kW) – export with Date and Time
xix. Instantaneous Voltage
xx. Instantaneous Phase Current – with direction
xxi. Instantaneous Neutral Current – with direction
xxii. Instantaneous Power Factor – with sign
xxiii. Instantaneous Active Power (kW) – with sign
xxiv. Instantaneous Apparent Power (kVA)

xxv. *Instantaneous Frequency*
xxvi. *Cumulative Tamper Count*
xxvii. *First Event Occurrence with Date and Time*
xxviii. *Last Event Occurrence with Date and Time*
xxix. *Last Event Restoration with Date and Time*
xxx. *Cover Open Information with date and time*
xxxi. *High resolution display for kWh (both Import & Export) - minimum 2+4*
xxxii. *Self Diagnosis*

Parameters to be displayed in **"Power Off"**display mode**Annexure – I (c)**

The following parameters shall be displayed on pressing the push button in power off condition :

i. *Cumulative Active Import Energy in kWh*
ii. *Cumulative Active Export Energy in kWh*

Tamper Event Recording Logic ----------**Annexure – II**

Sl No.	Tamper	Occurrence Threshold	Occurrence Time	Restoration Threshold	Restoration Time	Remarks
1	Power Failure	Vx<30% of Vref Ix<5% of Ib	3 min	Vx>40% of Vref	Immediate	
2	Single Wire / Neutral Missing	Ix>20% of Ib Vx<40% of Vref	3 min	Ix>1% of Ib Vx>50% of Vref	Immediate	Recording of energy must be started within 1 min. Indication must be provided.
3	Neutral Disturbance	As per bidder's tamper logic	3 min	As per bidder's tamper logic	3 min	Recording of energy must be started within 1 min. Indication must be provided.
4	Magnetic Tamper	As per bidder's tamper logic	1 min	As per bidder's tamper logic	1 min	
5	Earth Tamper	Iph-In > 6% of Imax Wattage > 24 watt Vx>60% &<115% of Vref PF>0.5	3 min	Iph-In < 6% of Imax Vx>60% &<115% of Vref PF>0.5	3 min	Indication must be provided